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COMPUTER TOMOGRAPHY OF FLOWS EXTERNAL TO TEST MODELS

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FINAL TECHNICAL REPORT

June 1, 1981 through August 31, 1982

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ABSTRACT

This report contains the results of a study of computer tomographic techniques for reconstruction of three-dimensional aerodynamic density fields from interferograms recorded from several different viewing directions. Emphasis is on the case in which an opaque object such as a test model in a wind tunnel obscures significant regions of the interferograms (projection data). This study was carried out in the Interferometry Laboratory of the Department of Mechanical Engineering and Applied Mechanics at the University of Michigan during the period June 1, 1981 through August 31, 1982.

The study was carried out in three phases:

1) The development and empirical study, using simulated data from analytical test fields, of a new method called the Iterative Convolution Method (ICM).

2) An empirical study, using simulated data from analytical test fields, of existing methods in which the field is represented by a series expansion.

3) The application of computer codes based on each of the above methods to analyis of real experimental data in the form of aerodynamic interferograms provided by George Lee of NASA Ames Research Center.

List of Symbols

x, y	Cartesian coordinates in the object domain
r, ϕ	polar coordinates in the object domain
ξ, η	Cartesian coordinates in Fourier domain
ρ, θ	modified polar coordinates in Fourier domain, see Eq. 3
θ	angle subtended by a ray of θ th projection and x axis in the object domain (measured counter clockwise from x axis, $0 \leq \theta < \pi$)
Y	Cartesian coordinate y turned counterclockwise about angle θ in the object domain
Y, θ	coordinates in the projection domain
r_o	radius of the circular region supporting the object domain
ρ_o	radius of cutoff circle in Fourier domain
$f(x,y)$	true object function (change of the index of refraction)
$f(r,\phi)$	$f(x,y)$ in Polar coordinates
$\hat{f}(Y,\theta)$	projection function, i.e. the Radon transform of $f(x,y)$ (order of the interference fringe multiplied by wavelength)
$F(\xi,\eta)$	Fourier transform of $f(x,y)$
$F(\rho,\theta)$	$F(\xi,\eta)$ in modified Polar coordinates
N	number of the available projections
M	number of the sampling points (rays) in each projection

1. INTRODUCTION

The tomographic reconstruction of a 3-D object field can be reduced to the reconstruction of its cross sections in a set of parallel planes. Therefore, this discussion is concentrated on the reconstruction of one 2-D cross-section of a 3-D refractive index distribution. Throughout this report the 2-D refractive index distribution in this cross-section is denoted as the object field and is described by an object function. The object function is considered to be space limited with nonzero field only in the interior of a circle of finite radius r_o.

It is also assumed that refractive bending of light rays passing through the object field is negligible. Rays are then straight lines and the projection function obtained from the interferograms is the 2-D Radon transform of the object function. This assumption generally is reasonable in wind tunnel diagnostics, except in the neighborhood of strong shocks.

The study reported herein is concentrated on the case of projection data which are incomplete because opaque aerodynamic test models in the wind tunnel block part of the object wave used to produce the interferogram. Only a few authors, such as Bates et. al.[3], Zien et. al.[4], and Vest et. al.[5], have considered reconstruction from incomplete data of this type.

We let $n(x,y)$ be the refractive index distribution of the object field and n_o be its value everywhere outside the circle of radius r_o then $f(x,y) = n(x,y) - n_o$ is the object function, $F(\xi,\eta)$ is its Fourier transform and $\hat{f}(Y,\theta)$ is its Radon transform, i.e., its projection function. In the object domain we use the

polar coordinates r,ϕ as well as the Cartesian coordinates x,y, and in the Fourier domain we use the modified polar coordinates ρ,θ, $-\infty \le \rho \le \infty, 0 \le \theta < \pi$ as well as the Cartesian coordinates ξ,η. In the projection domain only mutually perpendicular coordinates Y,θ ($-\infty \le Y \le \infty$) are used. If $K(Y,\theta)$ is the order of interference fringes and λ is the wavelength of light then $\hat{f}(Y,\theta) = K(Y,\theta)\lambda$.

2. The Choice of the Method.

Before introducing the new method developed under this contract for reconstruction from incomplete projections, let us briefly review the basic features of standard algorithms for reconstruction from complete projections.

There are three classes of algorithms -- Fourier transform methods, explicit methods and implicit (series expansion) methods.

The Fourier transform method is based on the Central Section Theorem which is summarized by Eq. (1):

$$F(\rho,\theta) = \int_{-\infty}^{\infty} \hat{f}(Y,\theta)\, \exp\,(-i2\pi\rho Y)dY \tag{1}$$

which indicates that the 2-D Fourier transform $F(\xi,\eta) \equiv F(-\rho\sin\theta, \rho\cos\theta)$ of the object function $f(x,y)$ along any diameter is equal to the 1-D Fourier transform of the projection function $\hat{f}(Y,\theta)$ along a line parallel to this diameter. The angle θ is measured counterclockwise from the x axis to the projection lines (light rays). Eq. (1) can be derived from the definition of the Fourier transform of $f(x,y)$:

$$F(\xi,\eta) = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x,y)\ \exp -i2\pi(\xi x+\eta y)dxdy \tag{2}$$

by substituting

$$\xi = -\rho\sin\theta \qquad \eta = \rho\cos\theta \tag{3}$$

where

$$-\infty\leq\rho\leq\infty \quad \text{and} \quad 0\leq\theta<\pi$$

and then substituting

$$\begin{aligned} Y &= -x\ \sin\theta + y\ \cos\theta \\ X &= x\ \cos\theta + y\ \sin\theta \end{aligned} \tag{4}$$

so that we get

$$F(\rho,\theta) = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(X,Y)\ \exp\ (-i2\pi\rho Y)dXdY \tag{5}$$

The quantities ρ and θ can be interpreted as modified polar coordinates in the Fourier domain. Eq. (1) follows from Eq. (5) given that

$$\hat{f}(Y,\theta) = \int_{-\infty}^{\infty} f(X,Y)dX \tag{6}$$

because X,Y simply are Cartesion coordinates located parallel and perpendicular to the projection direction, respectively.

Knowing the projection function $\hat{f}(Y,\theta)$ we can compute the Fourier transform $F(\rho,\theta)$ of the object function $f(x,y)$ along any

diameter by using Eq. (1). Then using the interpolation we can obtain $F(\xi,\eta)$ from $F(\rho,\theta)$ and finally by using the 2-D inverse Fourier transform we obtain the object function $f(x,y)$.

Explicit methods are based on the inverse 2-D Radon transform:

$$f(r,\phi) = \frac{1}{2\pi^2} \int_{-\pi/2}^{\pi/2}\int_{-\infty}^{\infty} \frac{\partial\hat{f}(Y,\theta)}{\partial Y} \frac{dY d\theta}{r\sin(\phi-\theta)-Y} \quad (7)$$

where, instead of Cartesian coordinates x,y, the polar coordinate r,ϕ have been used. Radon's formula, Eq. (7), directly gives the object field $f(r,\phi)$ by operating on the function $\hat{f}(Y,\theta)$. The most frequently used approximation for evaluating integral (7) was proposed by Ramachandran and Lakshminarayanan[6] and results in what is called the <u>convolution method</u>. It has been shown that by using the Fourier Transform (ρ,θ) we can write

$$f(r,\phi) = \int_{-\pi/2}^{\pi/2}\int_{-\infty}^{\infty} |\rho| F(\rho,\theta) \exp[i2\pi\rho r\sin(\phi-\theta)]\, d\rho d\theta \quad (8)$$

instead of Eq. (7). Now, writing formally

$$w(Y) = \int_{-\infty}^{\infty} |\rho| \exp(i2\pi\rho Y) d\rho \quad (9)$$

using Eq. (1) and letting

$$g(r\sin(\phi-\theta),\theta) = \int_{-\infty}^{\infty} \hat{f}(Y,\theta)\, w(r\sin(\phi-\theta) - Y) dY \quad (10)$$

we can rewrite Eq. (8) as

$$f(r,\phi) = \int_{-\pi/2}^{\pi/2} g(r \sin(\phi-\theta),\theta)\, d\theta \tag{11}$$

This means that if we can compute the weight function w(Y), then given the projection function $\hat{f}(Y,\theta)$ we can evaluate the convolution (10) and consequently compute the object function $f(r,\phi)$ with help of the integral (11). However, it is obvious that the integral (9) cannot be evaluated because it diverges as $\rho\to\infty$. Computationally, we replace the limits $-\infty$ and ∞ by $-\rho_o$ and ρ_o, where ρ_o is some large finite number. Therefore the convolution method introduces into the reconstruction an error which is dependent on the values of the spectrum $F(\rho,\theta)$ outside the cutoff circle of the radius ρ_o. The smaller the harmonics outside the cutoff circle are, the less is the error in the reconstructed object function. However, $F(\rho,\theta)$ can never be exactly zero outside any finite cutoff circle because $F(\rho,\theta)$ is the Fourier transform of a spacelimited object function.

In implicit methods we expand $f(x,y)$ or $\hat{f}(Y,\theta)$ in a series. Since the Radon transform is linear,

$$\hat{f}(Y,\theta) = \sum_i \sum_j a_{ij} \hat{b}_{ij}(Y,\theta) \tag{12}$$

if

$$f(x,y) = \sum_i \sum_j a_{ij}\, b_{ij}(x,y) \tag{13}$$

where $b_{ij}(x,y)$ are generating functions, a_{ij} are their coefficients and $\hat{b}_{ij}$ their Radon transforms. There are many ways of

choosing the generating functions or their Radon transform (see the summary in ref. 1 or 5). Having selected the generating functions we obtain the coefficients a_{ij} by solving Eq. (12) for a sufficient number of points (Y,θ). Knowing a_{ij} we obtain the values of the object function from Eq. (13).

Unlike Fourier transform and explicit methods, implicit methods can be applied directly to incomplete projections by selecting the points for computation of the coefficients a_{ij} in that part of the projection domain where data are available. However, the more restricted the region of available projection data is, the more ill-conditioned the system of equations for computing a_{ij} is. The application of the series expansion method to reconstruction from incomplete projections has been studied by Vest et. al.[5]. Their method exploits the analytical properties of the Radon transform and probably shows the most effective construction of the series expansion. However, the best choice for polynomials to represent the projection function along the radial coordinate Y is not obvious. For the reconstruction from complete projections the most suitable ortogonal polynomials would have a weight function equal to the envelope function[5]. However, for reconstruction from projections which are incomplete because of opaque objects in the field, Legendre polynomials with the weight function one probably would be the best choice.

For reconstruction from projections which are limited angularly or truncated radially, the best choice is probably Chebyshev polynomials of the second kind with the weight function

$\sqrt{1-Y^2}$, i.e., the polynomials $Q_n(Y) = U_{n+1}(Y)/(1-Y^2)^{1/2} \equiv \sin[(n+1)\arccos Y]/(1-Y^2)^{1/2}$.

Implicit series expansion methods are often complex to program and have relatively long computation times.

When one wants to use the Fourier transform or convolution method for reconstruction from incomplete projections, he must somehow extrapolate the projection function (data) into the region blocked by the opaque object. This approach has been used by Bates et. al.[3] and Zien et. al.[4] . Zien extrapolated the data across the blocked region by using the fact that the zero-order moment of the projection function $f(Y,\theta)$ with respect to Y has to be a constant for all the projections, i.e., any θ. (See ref. 5.) There is no more information in ref. 4 about the creation of the missing part of the projection function. However, there exist additional mathematical criteria for this extrapolation which are not used in Zien's method. Bates suggested the use of a series expansion to replace the missing projection data and set the object field equal to zero inside the opaque region in order to compute the coefficients of this series. There are some shortcomings of the Bates method. This method introduces considerable discontinuity into the object function and simultaneously brings the complexity of a series expansion method.

Our objective in this research project was to develop a reconstruction technique which works well when the projection data are incomplete because an opaque aerodynamic test model partially obscures the object wave used to form the holographic interferogram. Based on our review of available techniques we

concluded that the best technique probably is either a series expansion method or some iterative method. The series expansion method reported in ref. 5 probably is the best general approach because it "fills in" the region in which data are obscured by the opaque object with a function that satisfies all mathematical conditions for Radon transforms. In a sense it is a generalization of Zien's method.

Iterative processes appeared to be attractive because of their success in the related problem of reconstructing objects from their autocorrelations. This is a similar problem in that one has Fourier transform data that are incomplete because only the real parts are known. A similar iterative Fourier transform approach to reconstruction from projection data that are incomplete because the range of viewing directions is less than 180 has been successful[2]. However, for the reconstruction from incomplete projections it would be too cumbersome to use revisions in the Fourier domain because there is no frequency information. Therefore we decided to base our iterative technique on the convolution method. The technique is an extension of an approach recently reported by Braga and Vest[7]. This new iterative convolution method (ICM) is discussed in the following section.

3. The Iteration Convolution Method (ICM)

The usual, single-step, convolution method cannot be applied when part of the projection data are blocked by an opaque obstacle. To obtain an accurate reconstruction the ICM incorporates the measured projection data and apriori information about the object function through iterative revisions in

both the object and projection spaces.

3.1. Basic Description

The ICM can be broken into the following operations:

(a) Initialization of the missing projection data. (We must complete the projection data in order to use the convolution method.)

(b) Computation of the object field by using the convolution method.

(c) Revision in the object domain. (This revision consists of zeroing all the values of the computed object function outside the circle of radius r_o which is known to contain the object. It may also include zeroing either all negative or all positive values of the computed object function inside the circle of the radius r_o if it is known that the object function is everywhere positive or everywhere negative.)

(d) Computation of a new project function from the revised object function by path length integration.

(e) Revision in the project domain. (This revision replaces the computed projection data by the measured projection data everywhere that measured data are available.)

(f) The iteration process is repeated starting at (b) until it is terminated by using some suitable termination criterion.

To describe the method, we introduce a true object function $f(x,y)$ defined over the whole object domain including the region occupied by the opaque object. A true object function can be any function with discontinuities of the first kind whose Fourier transform exists and whose Radon transform exists and equals the

measured projection data everywhere these data are available.

One way of studying the properties of the ICM is to study the change of the mean square difference E between the true object function and the computed object function from one iteration to the next. Let $F(\xi, \eta)$ and $F(\rho, \theta)$ be the Fourier transforms of the true object function f(x,y) in Cartesian and modified polar coordinates, respectively. Let h(x,y) be the inverse Radon transform of $\hat{h}(Y, \theta)$, which is the revised projection function $\hat{f}(Y, \theta)$ in the step (e) of the ICM, and let $H(\xi, \eta)$ or $H(\rho, \theta)$ be the Fourier transform of h(x,y). Further, let us denote the quantities and functions computed in the i-th iteration by the subscript i. Then the relation between the n-th and (n+1)-st iteration can be described as follows:

$$E_n = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} |f(x,y) - f_n(x,y)|^2 dxdy =$$

$$= \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} |F(\xi,\eta) - F_n(\xi,\eta)|^2 \, d\xi d\eta$$

$$= \int_{0}^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta) - F_n(\rho,\theta)|^2 |\rho| \, d\rho d\theta$$

$$= a_n \int_{0}^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta) - F_n(\rho,\theta)|^2 \, d\rho d\theta$$

$$= a_n \int_{0}^{\pi}\int_{-\infty}^{\infty} |\hat{f}(Y,\theta) - \hat{f}_n(Y,\theta)|^2 \, dY d\theta$$

$$\geq a_n \int_{0}^{\pi}\int_{-\infty}^{\infty} |\hat{f}(Y,\theta) - \hat{h}_n(Y,\theta)|^2 \, dY d\theta$$

(revision in the projection domain)

$$= a_n \int_{0}^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta) - H_n(\rho,\theta)|^2 \, d\rho d\theta$$

$$= \frac{a_n}{b_n} \int_{-\infty}^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta) - H_n(\rho,\theta)|^2 |\rho| \, d\rho d\theta$$

$$= \frac{a_n}{b_n} \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} |F(\xi,\eta) - H_n(\xi,\eta)|^2 \, d\xi d\eta$$

$$= \frac{a_n}{b_n} \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} |f(x,y) - h_n(x,y)|^2 \, dxdy$$

$$\geq \frac{a_n}{b_n} \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} |f(x,y) - f_{n+1}(x,y)|^2 \, dxdy$$

(cutoff in the object domain)

$$= \frac{a_n}{b_n} E_{n+1} \tag{14}$$

where it has been formally put

$$a_n = \frac{\int_0^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta)-F_u(\rho,\theta)|^2 |\rho| \, d\rho d\theta}{\int_0^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta)-F_u(\rho,\theta)|^2 d\rho d\theta} \tag{15}$$

$$b_n = \frac{\int_0^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta)-H_u(\rho,\theta)|^2 |\rho| \, d\rho d\theta}{\int_0^{\pi}\int_{-\infty}^{\infty} |F(\rho,\theta)-H_u(\rho,\theta)|^2 d\rho d\theta} \tag{16}$$

and where the 2-D Parseval's relation between the object and its Fourier transform has been used and the 1-D Parseval's relation has been applied to the 1-D projection function and its Fourier transform. $\hat{f}_1(Y,\theta)$ is the initialized projection function.

The ICM approaches the true object function if $E_n > E_{n+1}$, i.e., if the mean square difference E decreases. The mean square difference E_n is greater than E_{n+1} if $a_n \geq b_n$, as is clear from Eq. (14). From Eqs. (15) and (16) we can presume that this inequality will be satisfied if the Fourier transform of f(x,y) is closer to the transform of $h_n(x,y)$ than to the transform of $f_n(x,y)$, particularly at the higher frequencies. Unfortunately, because the projection function $\hat{h}_n(Y,\theta)$ has a discontinuity of the first kind on the boundary separating the domain of the

measured and computed projections, in each iteration the ICM will approach a less and less suitable true object function as its higher harmonics beyond some cutoff circle of the radius ρ_o play a more and more important role. However, in practice we restrict considerations to the interior of this circle by evaluating the integral (9) with finite limits $\pm\rho_o$. (In fact the value ρ_o is determined by the number of sampling points used to represent the projection function; see Sec. 3.4.) Therefore, unlike the iterative Fourier transform method for reconstruction from angularly-limited projections [2], the ICM does not converge when reconstructing an object field surrounding an opaque obstacle. There is always an iteration beyond which the ICM will diverge.

The divergence of the ICM will occur even when the object function is represented by a finite number of sampling points, thereby eliminating a real discontinuity of the revised projection function. The finer the sampling chosen, the sharper the difference between regions of simulated and measured projection data will be, so an earlier and faster divergence of the ICM can be expected. On the other hand, if a coarser sampling is used a poor approximation to the projection function will result and consequently a higher reconstruction error will be obtained.

In conclusion, successful application of the ICM for reconstruction from incomplete projections will have a strong dependence on two factors:

(i) Selection of a suitable number of sampling points, and

(ii) Determination of the optimum point at which to terminate the iteration process.

Finally, we note that the situation is different for reconstruction from angularly limited projections, for which the true object function is given ambiguously so that the ICM does not have to select the true object function from an infinite set of functions. In this case the ICM usually will converge to an object function close to the true object function which can be recovered from the frequencies inside the cutoff circle of the radius ρ_o. This has been proved for iteration Fourier transform method [2,8,9].

3.2 Criteria for Number of Sampling Points

Evaluation of interferograms yields values of projection at discrete locations which generally are nonuniformly spaced. The integrals (10) and (11) therefore must be replaced by summations. Although the sampling points of the projection function generally are nonuniformly distributed we will consider here uniform spacing $\Delta\theta$ and ΔY between the individual projections and sampling points in each projection (including the blocked region). The function values of uniformly spaced points can be obtained by suitable interpolation of the nonuniformly distributed points. In Sec. 3.4 we will see that the convolution method requires the uniform spacing. For M uniformly spaced points over each of N uniformly spaced projections we have

$$\Delta Y = \frac{2r_o}{M-1} \tag{17}$$

$$\Delta\theta = \frac{\pi}{N} \tag{18}$$

where r_o is the radius of the circular domain of the spacelimited object function.

Rigorous criteria are available for choosing the number of projections N and the number of data points M in each projection when an object function with bandlimit ρ_o is to be reconstructed. Using the Whitaker-Shannon sampling theorem and following Klug and Crowther[10], the intervals ΔY and $\Delta\theta$ must obey the following inequalities:

$$\Delta Y \leq \frac{1}{2\rho_o} \tag{19}$$

$$\Delta\theta \leq \frac{\pi}{2\pi\rho_o r_o - 3} \tag{20}$$

However, in the current investigation the object is spacelimited rather than bandlimited. If it has substantial Fourier transform components outside a circle of radius ρ_o, aliasing[11] will occur. Substituting (17) into (19) and (18) into (20), the following criteria for the number of rays M and number of projections N are obtained:

$$M - 1 \geq 4 r_o \rho_o \tag{21}$$

$$N + 3 \geq 2\pi r_o \rho_o . \tag{22}$$

We see that there is no upper limit on the numbers M and N. However, when the ICM is used for the reconstruction from

incomplete projections, then from some value of M, as we discussed in Sec. 3.1, the larger M is, the greater the discrepancy between the computed and measured projection data. Consequently, poor reconstruction can be expected when sufficiently large values of M are used.

Combining Eqs. (21) and (22) gives:

$$\frac{N+3}{M-1} = \frac{\pi}{2} \tag{23}$$

The significance of this relation is discussed in subsequent sections.

3.3 Initialization

To apply the convolution method to the reconstruction of an object from incomplete projections, one has to fill in the missing part of the projection function. Using polynomials for this purpose yields a series expansion method. Instead of this, we have used a purely numerical method to fill in the incomplete projection data thereby initiatizing the ICM. Three possible requirements for selecting initial values to replace the missing data are:

(a) The values must represent a smooth continuation of the measured projection data within the limitation of the spacing of sampling points.

(b) The maximum absolute value of this artificial data is no larger than is necessary to satisfy requirement (a).

(c) The zero-order moments of all the projections are equal.

Three initialization schemes, designated by letters A, B and C were studied numerically. The first two requirements, (a) and (b), were satisfied in all three versions. Version C did not satisfy the third requirement.

Let $\hat{f}(Y_i,\theta_k)$ be the value of the projection function at the sampling point (Y_i,θ_k), where $1 \leq i \leq M$ and $1 \leq k \leq N$. In all three versions of the initialization the differences $\Delta_L(\theta_k)$ and $\Delta_F(\theta_k)$ are computed in each projection. For the k-th projection,

$$\begin{aligned} \Delta_L(\theta_k) &= \hat{f}(Y_L,\theta_k) - \hat{f}(Y_{L-1},\theta_k) \\ \Delta_F(\theta_k) &= \hat{f}(Y_F,\theta_k) - \hat{f}(Y_{F+1},\theta_k) \end{aligned} \tag{24}$$

where i=L and i=F (L < F) denote the measured projection values closest to the two edges of the blocked region in the projection data. The artificially introduced projection data in the blocked region are computed from the recursion formulas:

$$\begin{aligned} \hat{f}(Y_{L+\ell},\theta_k) &= \hat{f}(Y_{L+(\ell-1)},\theta_k) + \Delta_L(\theta_k)/\ell - \Delta(Y_\ell,\theta_k) \\ \hat{f}(Y_{F-\ell},\theta_k) &= \hat{f}(Y_{F-(\ell-1)},\theta_k) + \Delta_F(\theta_k)/\ell + \Delta(Y_\ell,\theta_k) \end{aligned} \tag{25}$$

where

$$\Delta(Y_\ell,\theta_k) = 2\{\hat{f}(Y_{L+(\ell-1)},\theta_k) - \hat{f}(Y_{F-(\ell-1)},\theta_k) + (\Delta_L(\theta_k)$$

$$- \Delta_F(\theta_k)) /\ell]/(\ell_{MAX}(\theta_k) - 2(\ell-1))^2, \tag{26}$$

$$\ell = 1,2,3\ldots T[\ell_{MAX}(\theta_k)/2], \tag{27}$$

$$\ell_{MAX}(\theta_k) = F(\theta_k) - L(\theta_k), \tag{28}$$

and T[ ] denotes a truncated value. Using these relations, the simple intialization of the projection data having the first two required properties (a) and (b) is made. This describes intitialization scheme C.

A mathematical requirement for a projection function to be a Radon transform is that the n-th moment of $\hat{f}(Y,\theta)$ with respect to Y have circular harmonics of degree less than or equal to n. In particular, if n=Ø the moment is constant in all projections and equal to the integral of f(x,y) over the entire domain[5]. In version B, the zero-order moment of each projection,

$$m(\theta_k) = \int \hat{f}(Y,\theta_k)\, dY, \tag{29}$$

is computed by using the trapezoidal rule. Further, the maximum zero moment m_{MAX} is determined. Having found the projection which has this maximum moment, the previously-computed values of the projection function for each of the other projections are revised so that each has the same zero-order moment $m(\theta_k)$ equal to m_{MAX}. In the k-th projection this is done by applying the relations

$$\hat{f}_{NEW}(Y_{1+\ell},\theta_k) = f(Y_{1+\ell},\theta_k) + D(Y_\ell,\theta_k)$$

$$\hat{f}_{NEW}(Y_{F-\ell},\theta_k = \hat{f}(Y_{F-\ell},\theta_k) + D(Y_\ell,\theta_k) \tag{30}$$

where

$$D(Y_\ell,\theta_k) = \frac{(m_{MAX}-m(\theta_k))\ell}{1+1+2+2+3+3+\ldots+(\ell_{MAX}-1)}, \tag{31}$$

$l_{MAX}(\theta_k)$ is given by (28) and integer ℓ goes again through the values given by (27). This primarily changes the computed projection function in the center of the blocked region and only minimally affects the smooth transition of the initialized projection function from the measured to the computed domain.

The version A uses the same revision of the computed projection data; however, the maximum zero moment m_{MAX} is selected from the projections having minimum $l_{MAX}(\theta_k)$, i.e. from the projections that have the smallest blocked region.

The probability that the initialized projection function is the Radon transform of some true object function is obviously higher in the case of the versions A and B than in the case of the version C.

3.4. Computation of the Object Function

Having projection data over the whole projection domain we can start to compute the object function.

First recall that the infinite limits of the integral (9) must be replaced by sufficiently large finite values $-\rho_o$ and ρ_o. After this substitution, Ramachandran and Lakshminarayanan[6] showed that a suitable weight function w(Y) for use in Eq. (10)

may be exactly represented by discrete sample values uniformly distributed with spacing $\Delta Y = 1/2\rho_o$. They derived

$$\begin{aligned} w(m(\Delta Y)) &= 1/4(\Delta Y)^2 \quad \text{for } m = 0 \\ &= -1/[\pi m(\Delta Y)]^2 \quad \text{for } m = \text{odd} \qquad (32) \\ &= 0 \quad \text{for } m = \text{even} \end{aligned}$$

where m is an integer. Note that the Fourier transform of this weight function is a triangular function with period $2\rho_o$ and not the function $|\rho|$.

Now, assuming that we also know the projection function at sample points with uniform spacing $\Delta Y = 1/2\rho_o$, we can replace the convolution integral (10) by the summation

$$g(m(\Delta Y),\theta_k) = \frac{1}{\Delta Y}\left\{\frac{\hat{f}(m(\Delta Y),\theta_k)}{4} - \frac{1}{\pi^2}\sum_{p\ \text{odd}}\frac{\hat{f}((m+p)(\Delta Y),\theta_k)}{p^2}\right\} \qquad (33)$$

However, to evaluate the integral (11) we need to know the values of this convolution function not only at the points $m(\Delta Y)$, where m is integer, but at the points

$$\mu(\Delta Y) = r\sin(\phi-\theta_k) \qquad (34)$$

where, for given r and ϕ, the number μ equals

$$\mu = (\beta\cos\theta_k - \alpha\sin\theta_k)/(\Delta Y) \qquad (35)$$

$$\text{and } \theta_k = k(\Delta\theta) \qquad (36)$$

$$\text{if } k = 0,1,2\ldots N-1 \text{ and } \begin{aligned} \beta &= r\sin\phi \\ \alpha &= r\cos\phi \end{aligned} \qquad (37)$$

To find these values of the convolution function instead of those given by (33) the following linear interpolation is commonly used:

$$g(\mu(\Delta Y),\theta_k) = (m+1-\mu)g(m(\Delta Y),\theta_k) + (\mu-m)g((m+1)(\Delta Y),\theta_k). \tag{38}$$

Finally, we obtain the object function at any point (r,ϕ) by replacing the integral (11) by the discrete summation

$$f(r,\phi) = \sum_k g[\mu(r,\phi)(\Delta Y),\theta_k]\cdot(\Delta\theta) \tag{39}$$

In the ICM we used this computational procedure; however, we note that different weight functions also have been applied by various authors [12, 13, 14]. All these modifications involve some suppression of the higher frequencies of the weight function (32) in the interval $-\rho_o$ to ρ_o in order to reduce noise due to the statistical fluctuation in the data. For our purpose the Ramachandran and Lakshminarayanan weight function (32) is probably the best choice due to the discontinuities between the available and computed projection data created in each iteration of the ICM.

3.5. Computation of the Projection Function

After computing the object function and effecting its revision in the object domain, the ICM goes back to the projection domain to make a revision. The computation of (NxM) points of the new projection function is made by evaluating the path-

length integral (6) (NxM) times. To evaluate each of these integrals, we need L samples of the object function, so we must carry out the procedure of paragraph 3. (LxNxM) times to find the (LxNxM) values of the object function.

After considering several methods of numerical integration, we selected Gaussian quadrature as the most suitable method for our purpose. This method requires a small number of sampling points for a given accuracy, and they can be distributed nonuniformly as is suitable for this application. We assume the field has no discontinuities.

The most time-consuming operation in the convolution method is the computation of the number μ given by Eq. (35). For the computation of (LxNxM) object points we need to compute Nx(LxNxM) values of μ because each object point is used in each projection. This requires N^2 computations of the sine and cosine functions. We have reduced these computations substantially by exploiting the fact that the same distribution of sampled object points only turned about $k(\Delta\theta)$, is needed for computation of the individual projections.

Let any object point which is needed for the computation of the projection data in the k-th projection have a value of μ designated as μ_{ik} in the i-th projection, $0 \leq i, k \leq N - 1$. Then

$$\mu_{ik} = r \sin(\phi_k - i(\Delta\theta))/(\Delta Y) \tag{40}$$

where

$$\phi_k = \phi_o + k(\Delta\theta) \tag{41}$$

so that

$$\mu_{ik} = r \sin(\phi_o - (i-k)(\Delta\theta))/(\Delta Y) \tag{42}$$

and by using Eqs. (37)

$$\mu_{ik} = [\beta\cos((i-k)(\Delta\theta)) - \alpha\sin((i-k)(\Delta\theta))]/(\Delta Y) \tag{43}$$

where α, β are Cartesian coordinates of (LxM) sampling object points for the computation of the 0-th projection. Substituting $\ell = i-k$ we get

$$\mu_{\ell+k\ k} = \beta\cos(\ell(\Delta\theta)) - \alpha\sin(\ell(\Delta\theta)) \tag{44}$$

where $1 - N \leq \ell \leq N - 1$. Using arrays of (2N-1) terms for cosine, sine and μ, we have reduced the need for the computation of these functions by a factor of $(2N-1)/N^2$.

Gaussian quadrature has been applied with fifteen sampling points (L = 15).

3.6 Termination of the Iteration Process

In Sec. 3.1 it was noted that we expect the ICM method to converge to a reconstruction of maximum accuracy and then diverge during subsequent iterations. It therefore is crucial to determine a reliable criterion for terminating the iterations. Attempts to determine this criterion analytically were unsuccessful, so we resorted to an empirical investigation. A large number of ICM reconstructions of known object functions from incomplete projections were made. In each, the RMS error of the computed object functions was calculated on the bounding circle of radius r_o at the end of each iteration. Similarly, the

RMS error of the computed projection function over the region in which measured data are available was calculated. By observing the values of these RMS errors as a function of the overall accuracy of reconstruction, an empirical criterion for terminating the iterations was developed. This is described in Sec. 4.

4. Numerical Investigation of the Iterative Convolution Method

An empirical investigation of the ICM was carried out in order to study its convergence/divergence properties, to assess the effects of the number of projections N and the number of data points per projection M on the accuracy of reconstruction, and to determine an appropriate criterion for termination of the iterative process. In addition, various schemes for initializations and for revision of the projections and reconstructions during iteration were evaluated. The accuracy of this method also was compared to that obtained by a series expansion method reported in ref. 5.

4.1 Procedure and Results

In order to conduct a numerical study, we had to select both test object fields (analogous to the gas density distribution in actual application) and the shape and size of embedded opaque obstacles (analogous to the cross section of the opaque aerodynamic test model in actual application).

The test object functions f(x,y) were selected to be the same as those used in ref. 5 in order to make comparisons of accuracy. Each object function is zero outside a circle of

radius $r_o = 1$. The analytic expressions of the test functions used in the study are:

$$f(x,y) = \exp\{1-3[(x-a)^2+y^2]\}[1-(x^2+y^2)]^{1/2} \tag{45}$$

and

$$f(x,y) = \exp\{\frac{-6[(x-0.6)^2+y^2]}{1-(x^2+y^2)}\} + 0.5\exp\{\frac{-6[(x+0.6)^2+y^2]}{1-(x^2+y^2)}\} + \exp\{\frac{-6[x^2+(y-0.6)^2]}{1-(x^2+y^2)}\} + 0.5\exp\{\frac{-6[x^2+(y+0.6)^2]}{1-(x^2+y^2)}\} \tag{46}$$

where a is a parameter of the function (45). We used a = 0.2944 and a = 1.0351. For the former and latter values the test function (45) is designated as <u>NO1b</u> and <u>NO1d</u>, respectively. The test function (46) is designated as <u>NO2</u>.

Function NO1b and NO1d are two-dimensional Gaussian distributions differing from each other in that NO1d has a very steep gradient close to one boundary. Function NO2 has four maxima two of which are twice as high as the others. NO1d and NO2 are more complicated and difficult to reconstruct than distributions which would be met in subsonic flows near simple test models. However, for the investigation of properties of the ICM such test functions are very helpful.

Each of these test functions has been studied with four different embedded opaque objects. Two were circular discs of radius $r_c \simeq 0.3$ and $r_c \simeq 0.6$ both centered at the origin and the other two were triangular objects having the sizes and positions shown in Fig. 1 where the sketched circle has radius $r_c = 0.6$. The larger triangular is designated by the letters TB and the

smaller one is designated by the letters TS. The smaller circular disc is designated as C3 and the bigger one as C6.

In the n-th iteration, the reconstructed test function $f_n(x_i,y_i)$ is calculated at uniformly spaced discrete points (x_i,y_i) and is compared with the exact values of the test function $f(x_i,y_i)$. 30 x 30 sampling points of intersections of the square net has been evaluated. 648 of these points are inside the circle of radius r_o. As in ref. 5, the average percent error in the n-th reconstruction is defined as

$$\frac{1}{I \cdot J} \sum_{i=1}^{I} \sum_{j=1}^{J} \frac{|f_n(x_i,y_j)-f(x_i,y_j)|}{\max|f(x_i,y_j)|} \cdot 100 \tag{47}$$

The maximum value as well as any other value is chosen by excluding the region occupied by the opaque object. Both the average and maximum errors have been used for comparing the results from different iterations and different reconstructions.

4.2 Evaluation of the Numerical Results

The results of the numerical investigation are displayed in a series of plots and tables. Both plots and tables show dependence of the average and maximum percent error of the reconstructed field as a function of various parameters. In all the plots, solid and broken lines are used for the average and maximum percent error, respectively. Most of the plots are organized as five groups of twelve figures. The figures in each group have the same figure number and are distinguished by a small letter following the number.

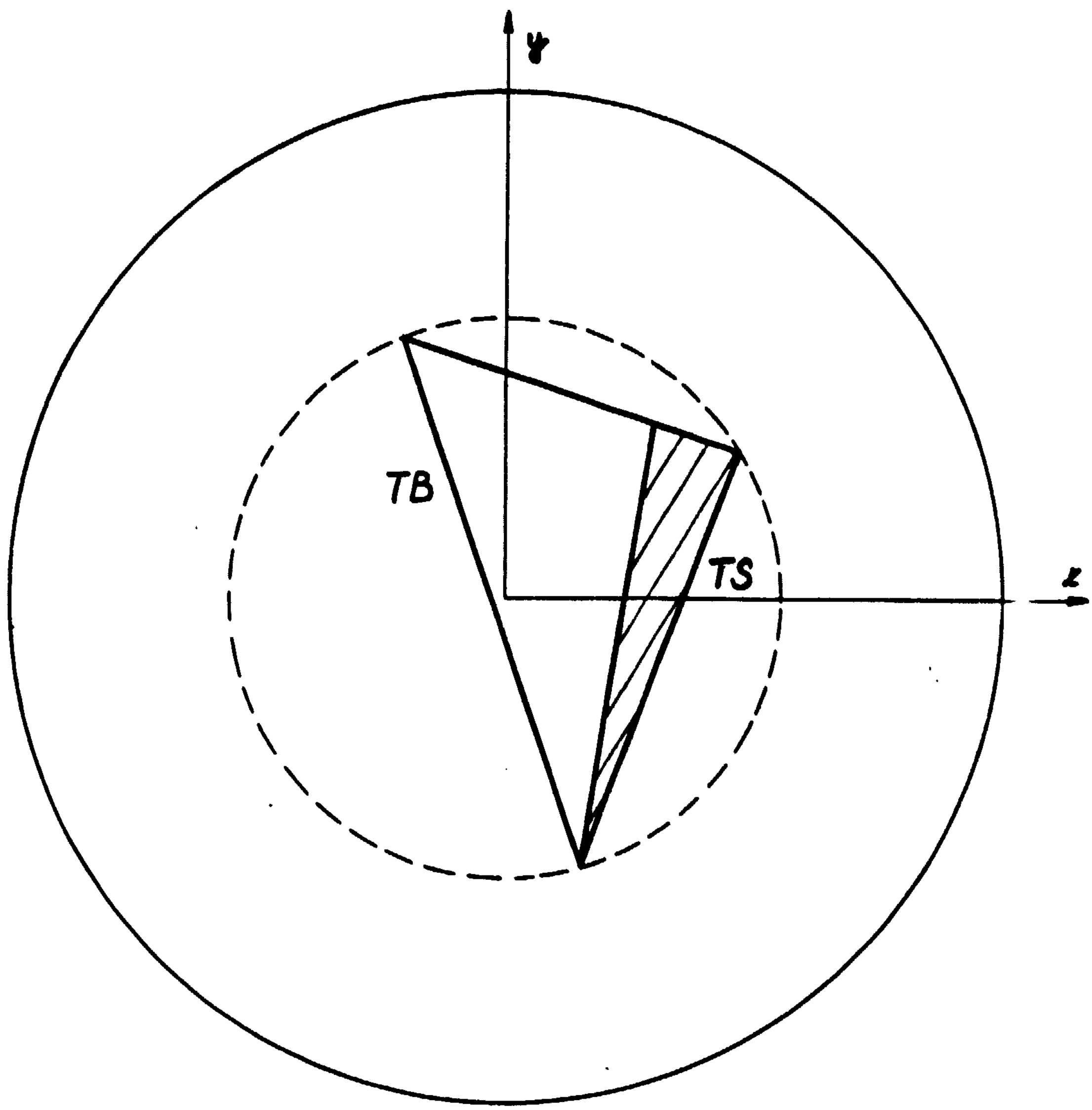

Figure 1

The twelve figures 2a to 2ℓ are plots of PE (percent errors) versus ITR (number of iterations). Three ways of initializing the iteration, A, B and C, which were described in paragraph 3.3, are considered. The letter R is used to designate the results at the iteration specified by the termination criterion discussed in paragraph 4.2.4. Figures 3a to 3ℓ are also plots of PE versus INT; however, the parameter is the number of projections N. The number of data points M in each projection is fixed. Figures 4a to 4ℓ are plots PE versus N and M is again fixed. The errors of computed points are always taken from the iteration providing the minimum average error. Each computed point is marked by the number of this iteration. If this iteration differs from that indicated by the termination criterion the result of the latter iteration is also shown in the plot. The discrete points of the plots for which the computation has been made are indicated by small circles or small crosses. The circle is used when the RMS object error on the edge circle of the object domain has its minimum in the same iteration as the RMS projection error over the region of available projection data. Otherwise the small cross is used. Figures 5a to 5ℓ are plots PE versus ITR, the parameter is M and N is always matched to M, using Eq. (23). The iteration selected by the termination criterion is again designated by R. Figures 6a to 6o are plots PE versus M for N matched according to Eq. (23). These plots are made and designated in the same way as those of Fig. 4.

Each letter connected with the figure number determines one test object function and one opaque obstacle in agreement with the scheme summarized in Table 1.

TABLE 1

opaque obstacle/test function	NO1b	NO1d	NO2
C3	a	b	c
C6	d	e	f
TS	g	h	i
TB	j	k	l
none	m	n	o

For instance, plots of Fig. 6c are plots PE versus M for the reconstruction of the test function NO2 with the embedded opaque obstacle C3.

In the next paragraphs the numerical results are discussed and evaluated.

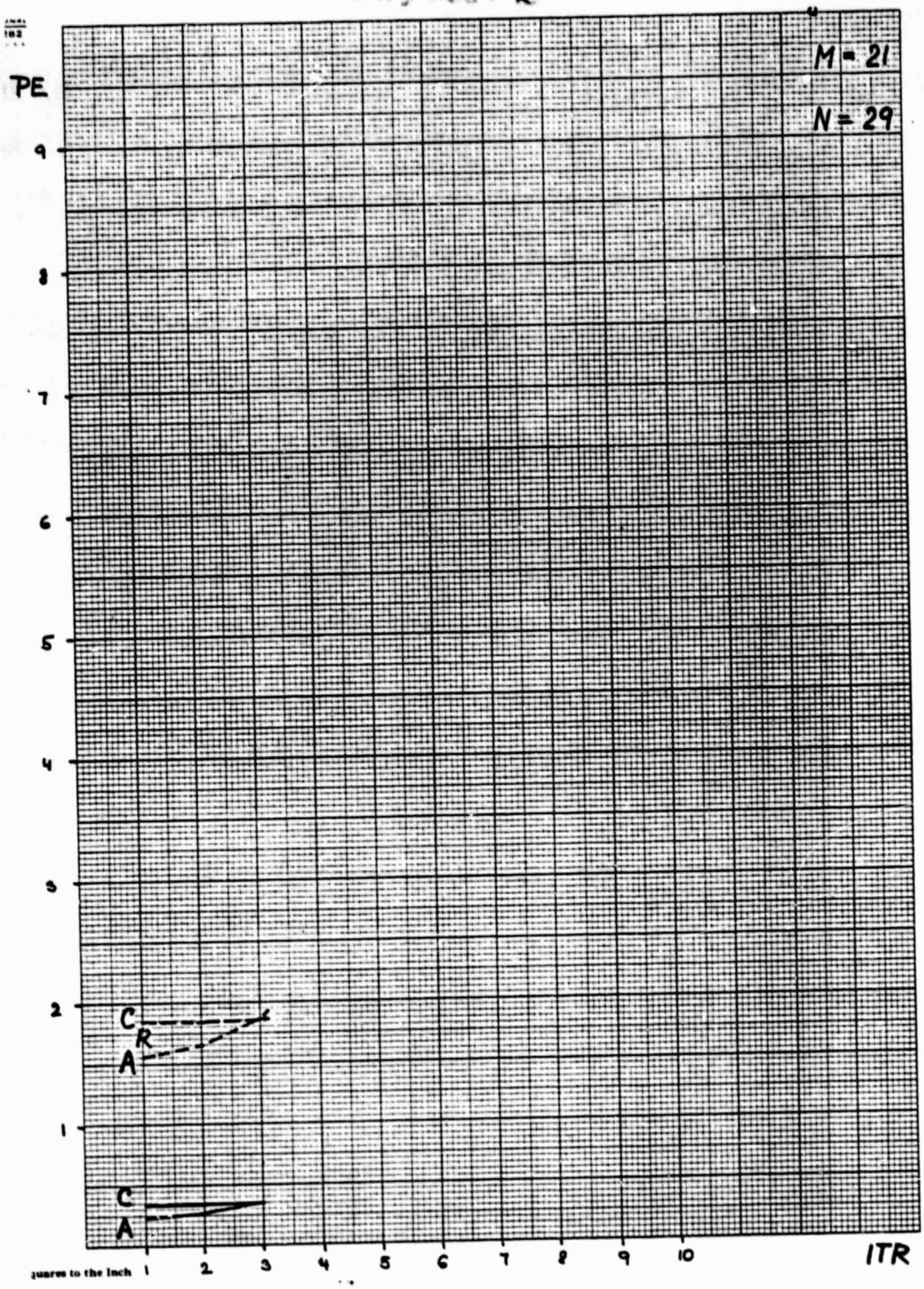
PE
M = 21
N = 29
9
8
7
6
5
4
3
2
1
C
R
A
C
A
1
2
3
4
5
6
7
8
9
10
ITR
squares to the inch

Figure 2a

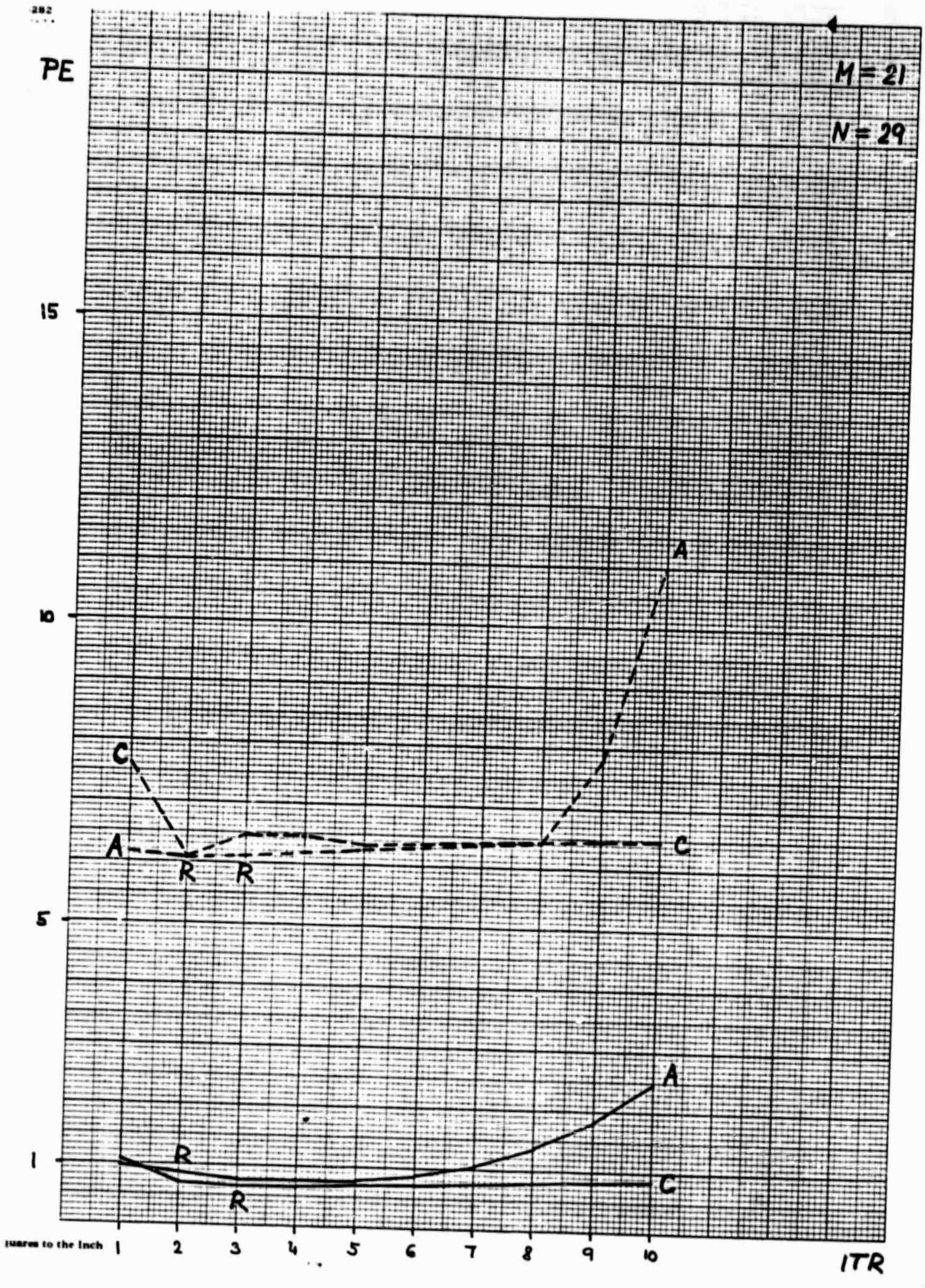

Figure 2b

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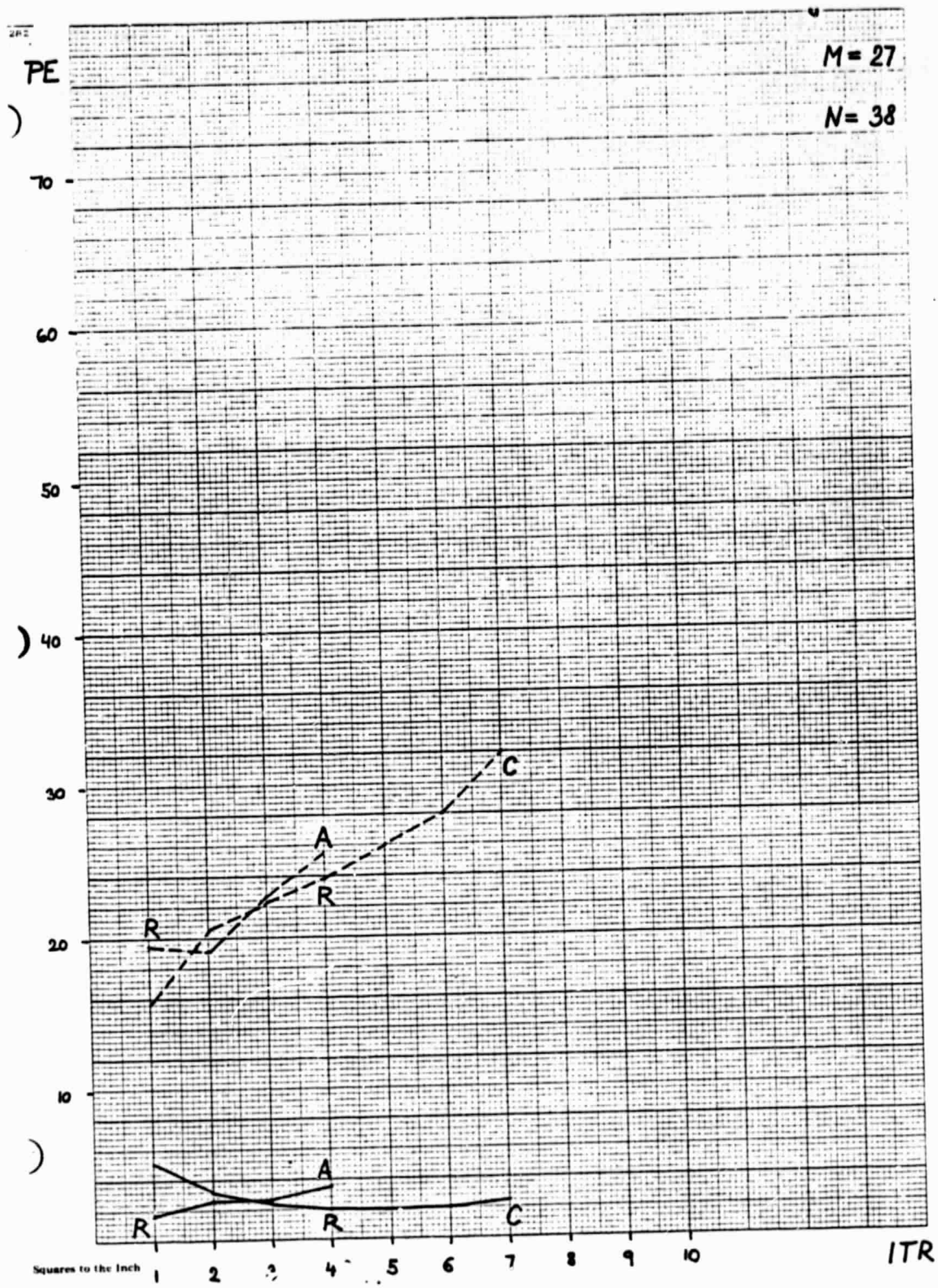

Figure 2c

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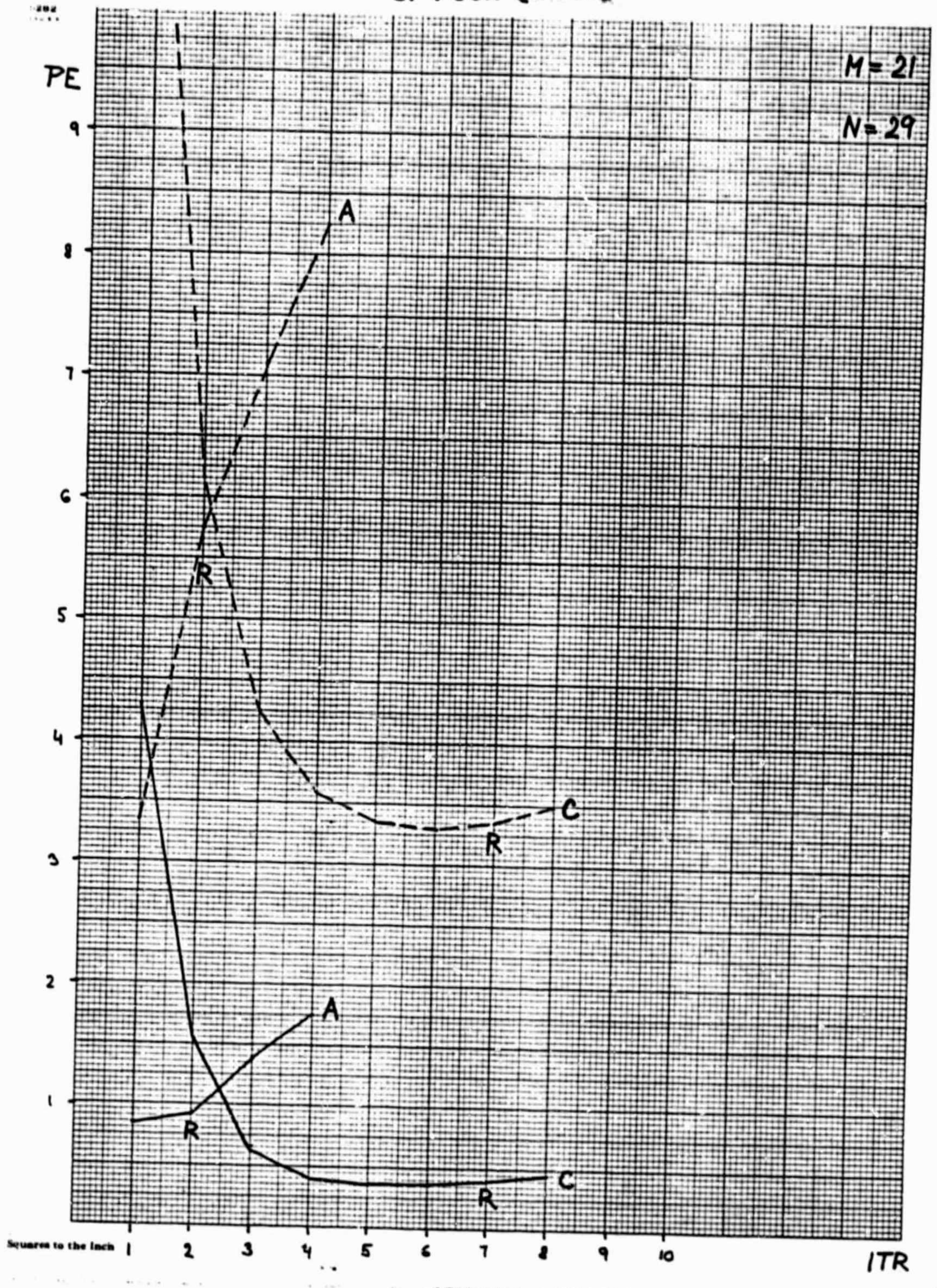

Figure 2d

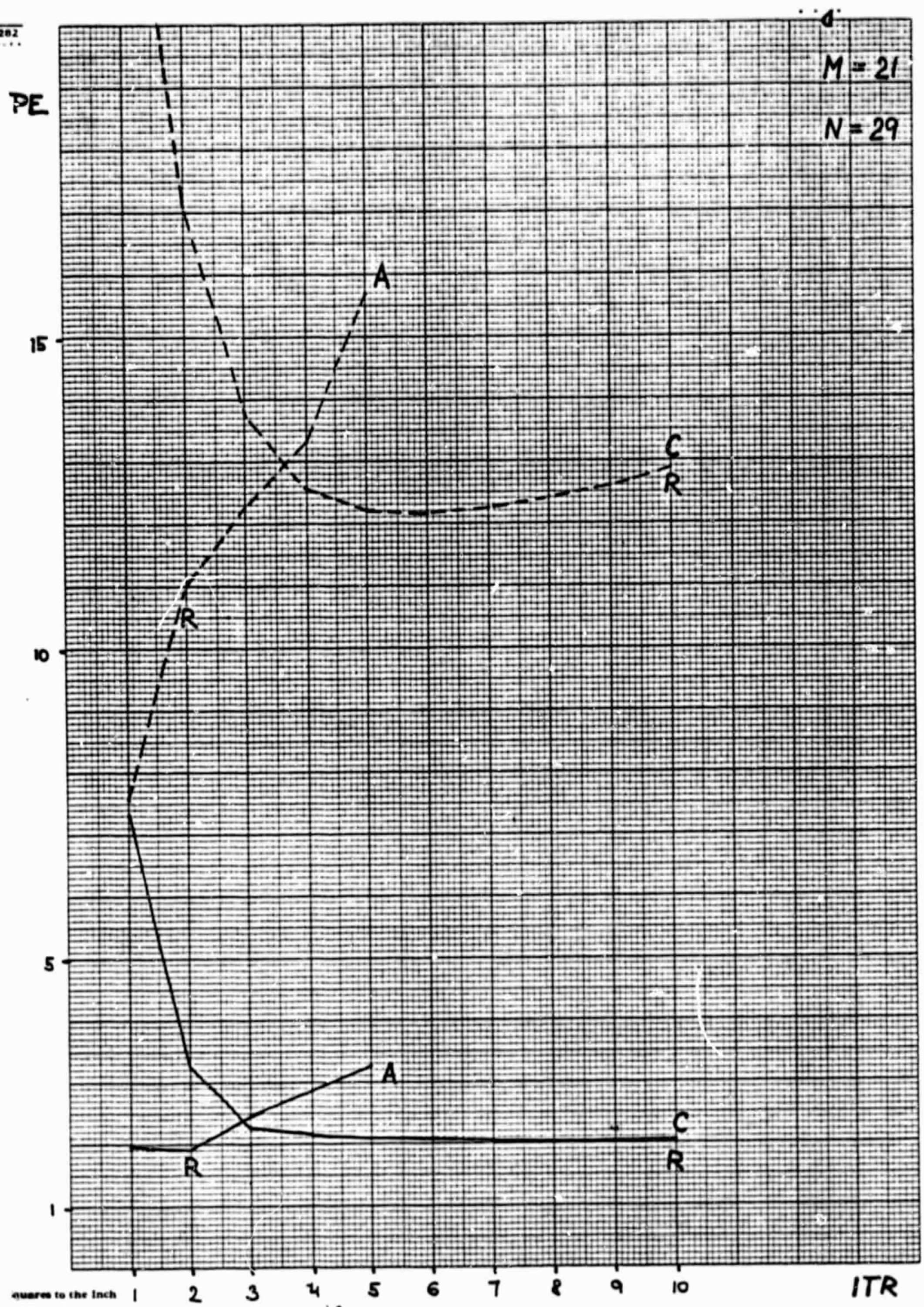

Figure 2e

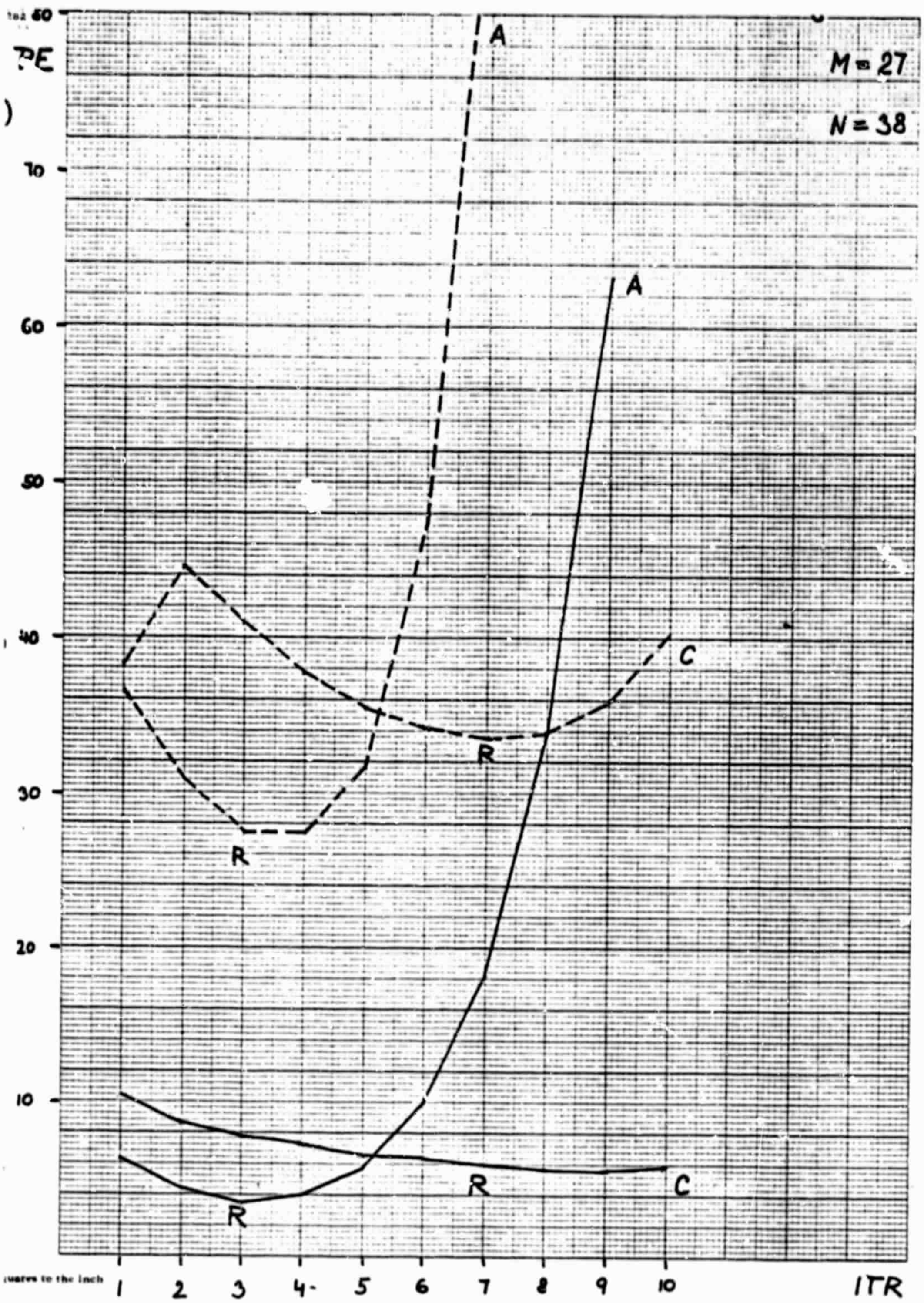

Figure 2f

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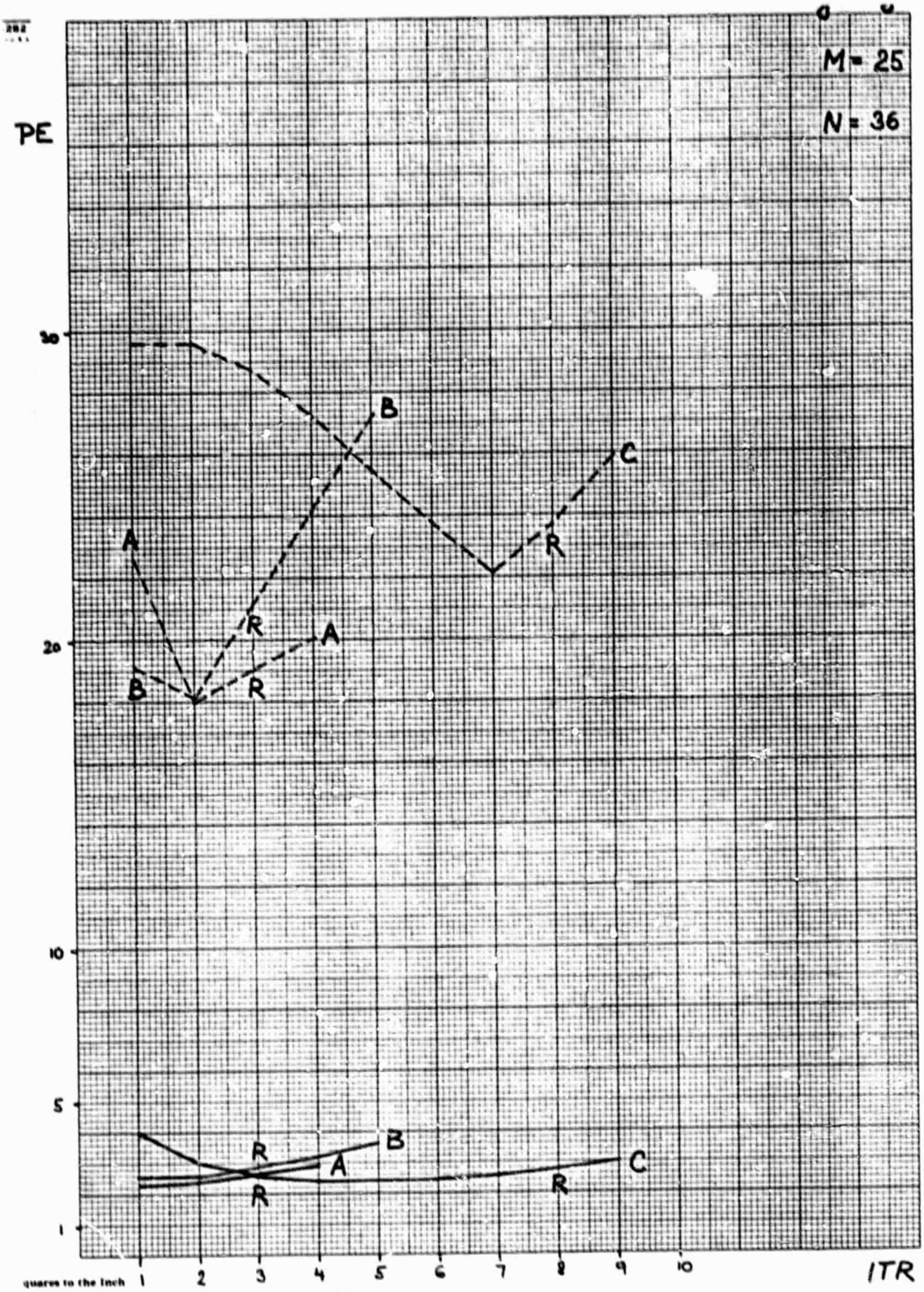
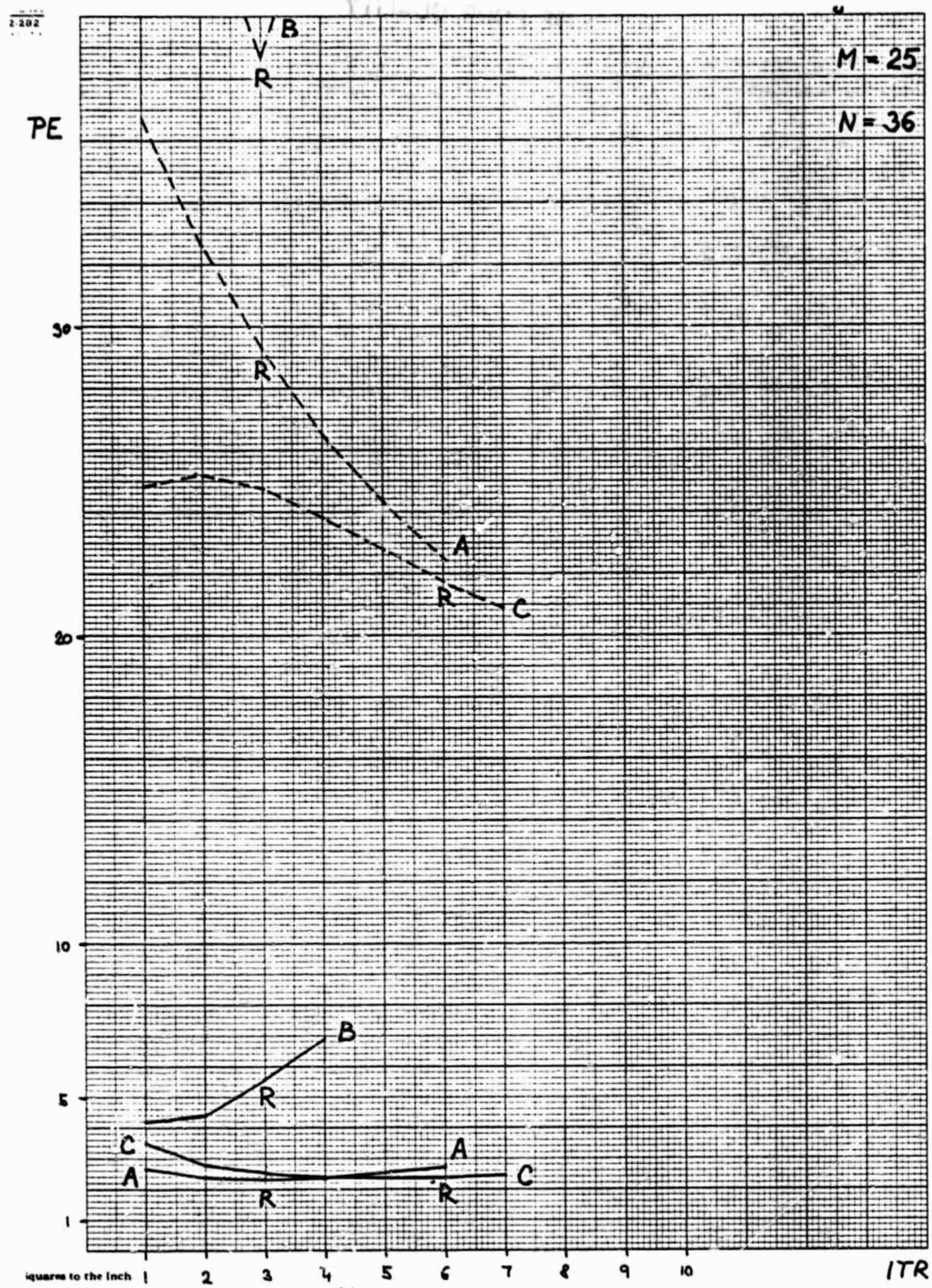


Figure 2g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N = 36
PE
ITR
30
20
10
5
1
1
2
3
4
5
6
7
8
9
10
A
B
C
R
Squares to the Inch

Figure 2h

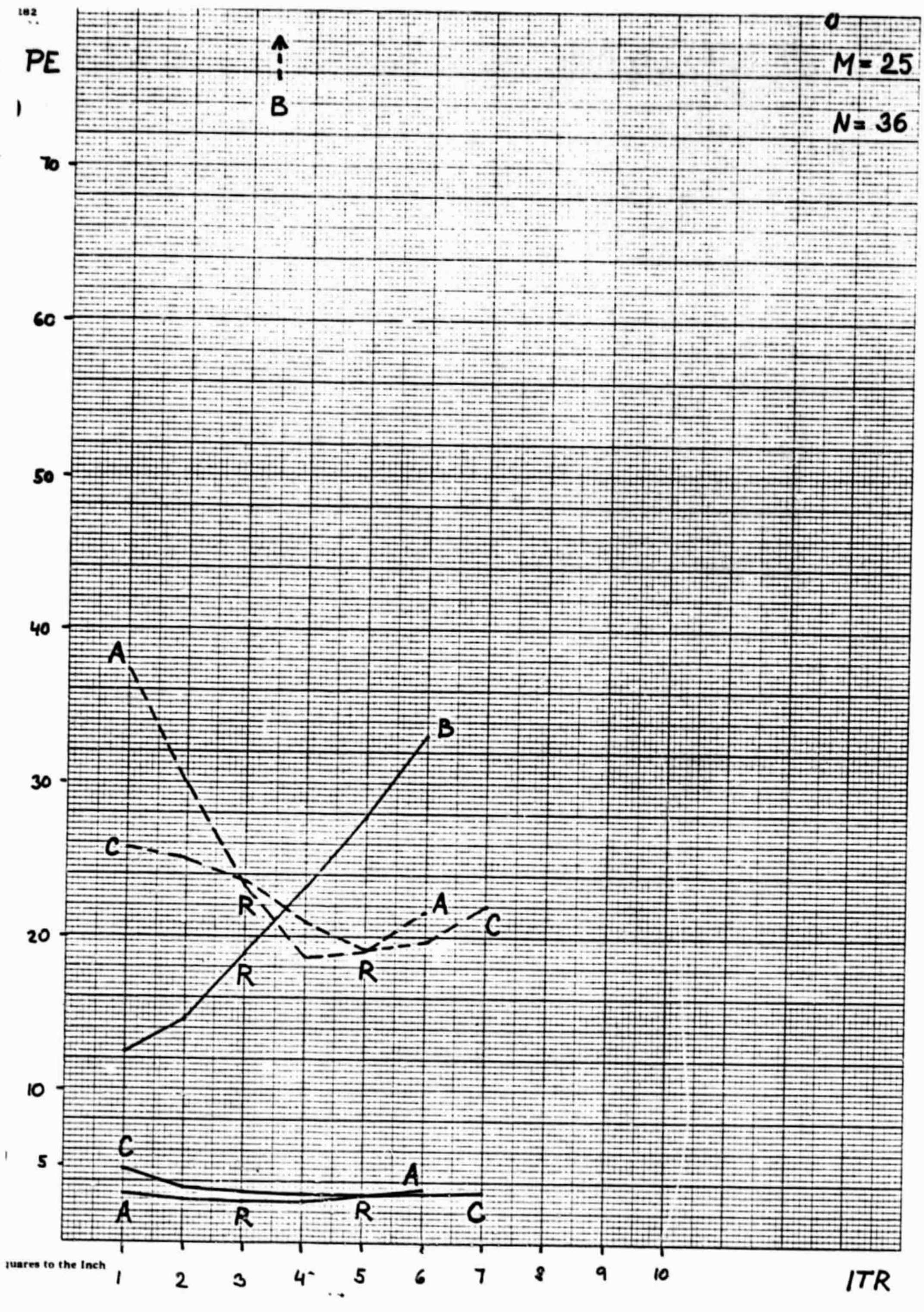
PE
M= 25
N= 36
B
70
60
50
40
30
20
10
5
A
B
C
R
A
C
R
R
C
A
A
R
R
C
1
2
3
4
5
6
7
8
9
10
ITR

Figure 2i

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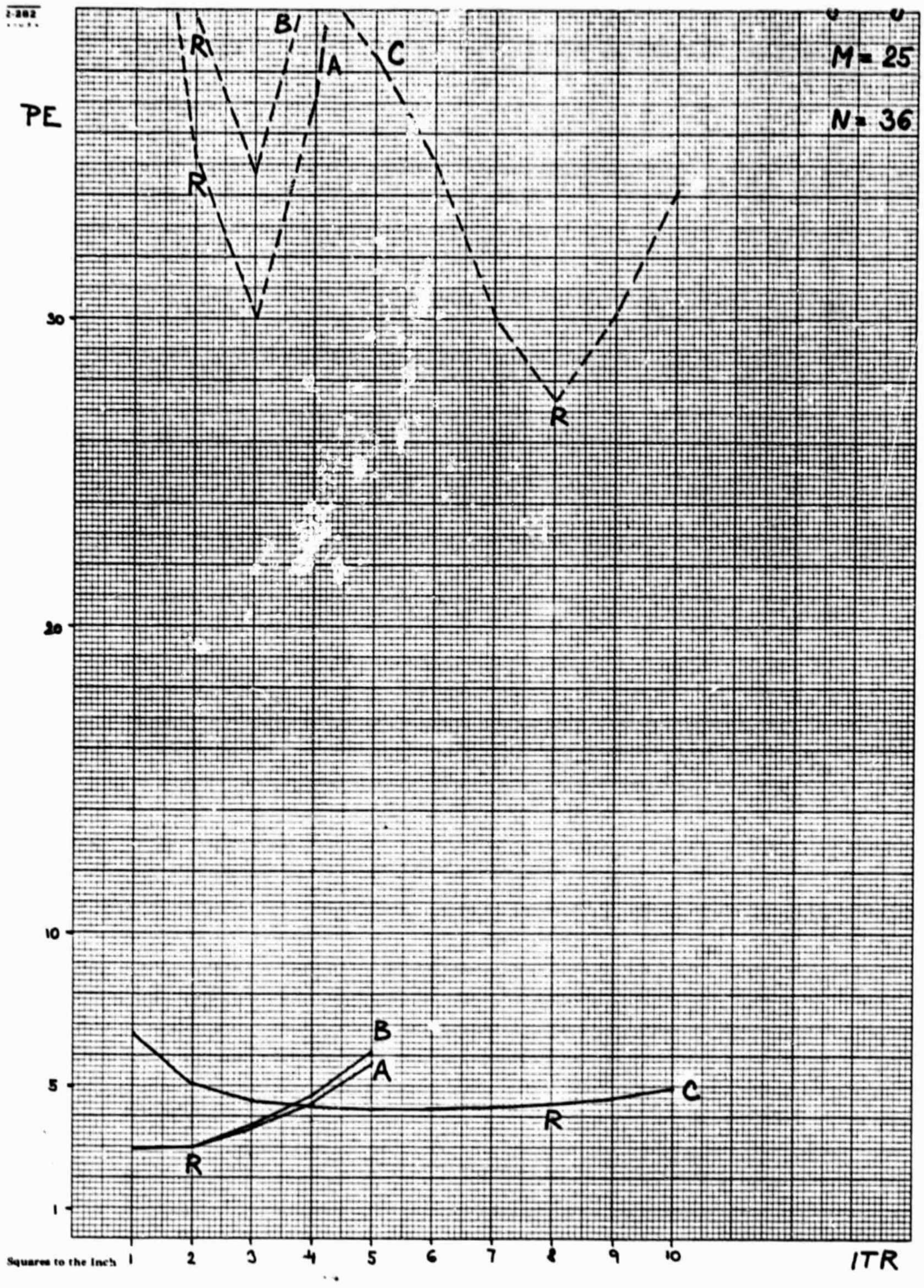

Figure 2j

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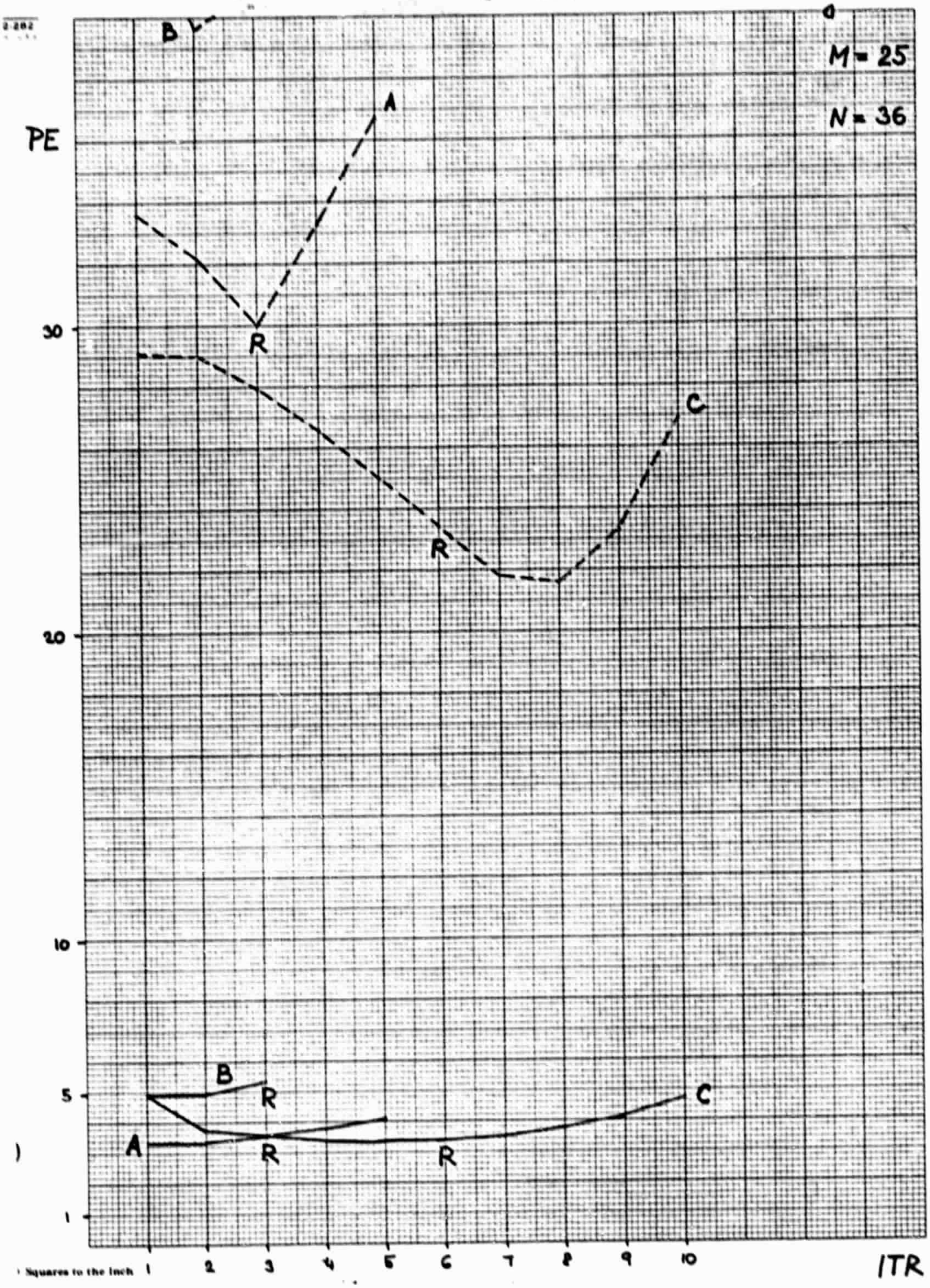


Figure 2k

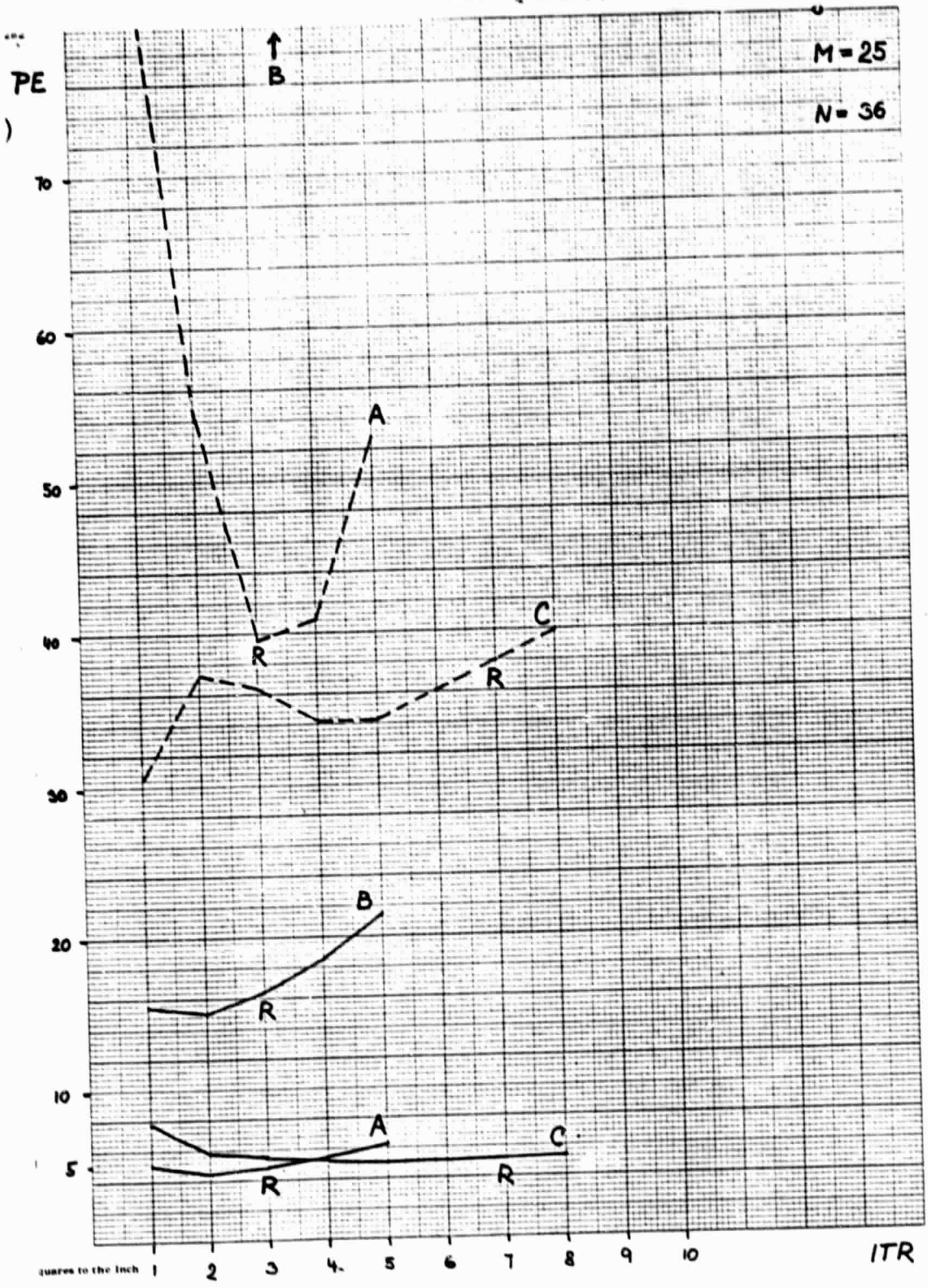
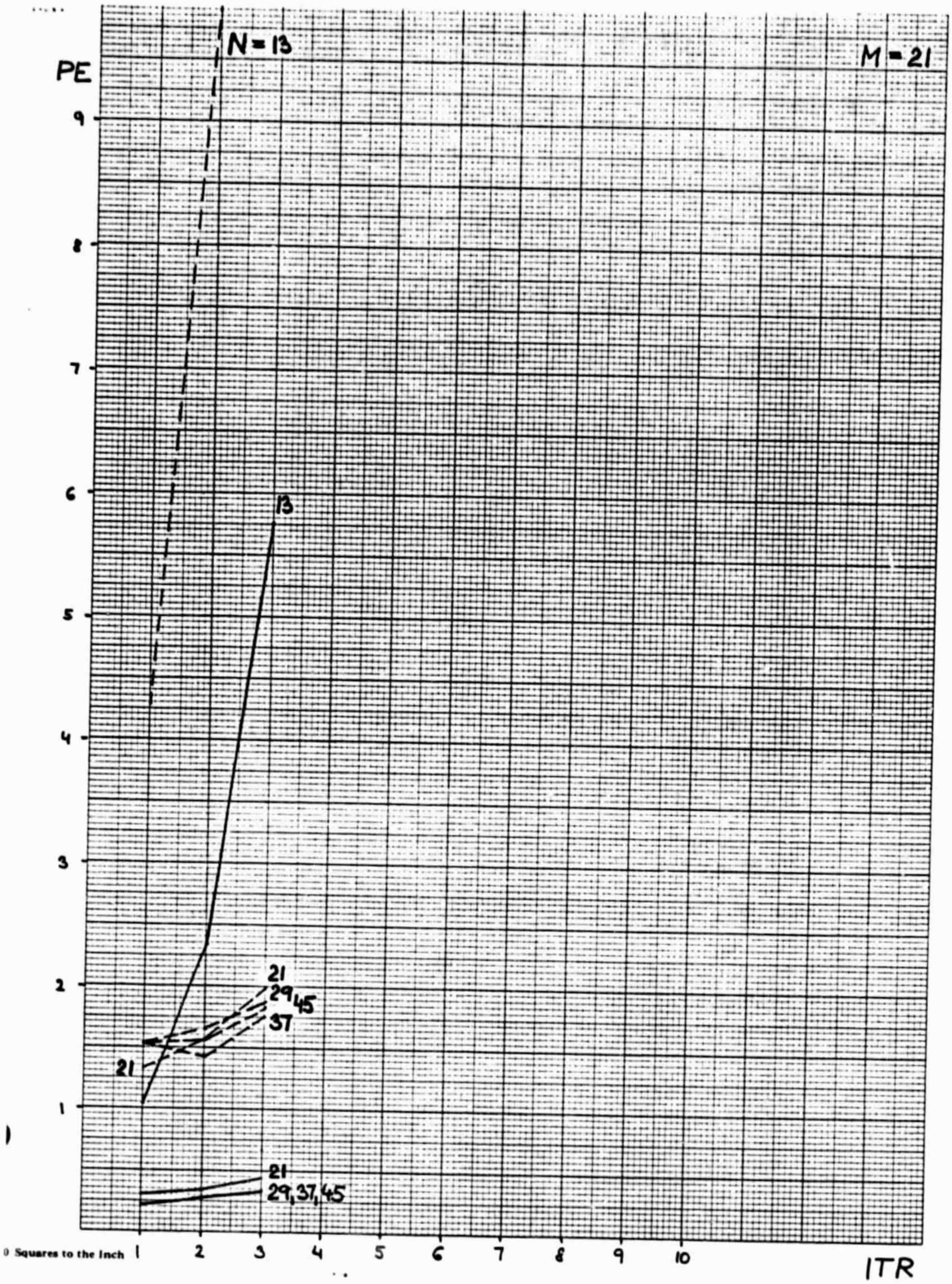

PE
)
M = 25
N = 36
70
60
50
40
30
20
10
5
B
A
R
C
R
B
R
A
C
R
R
quares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 2ℓ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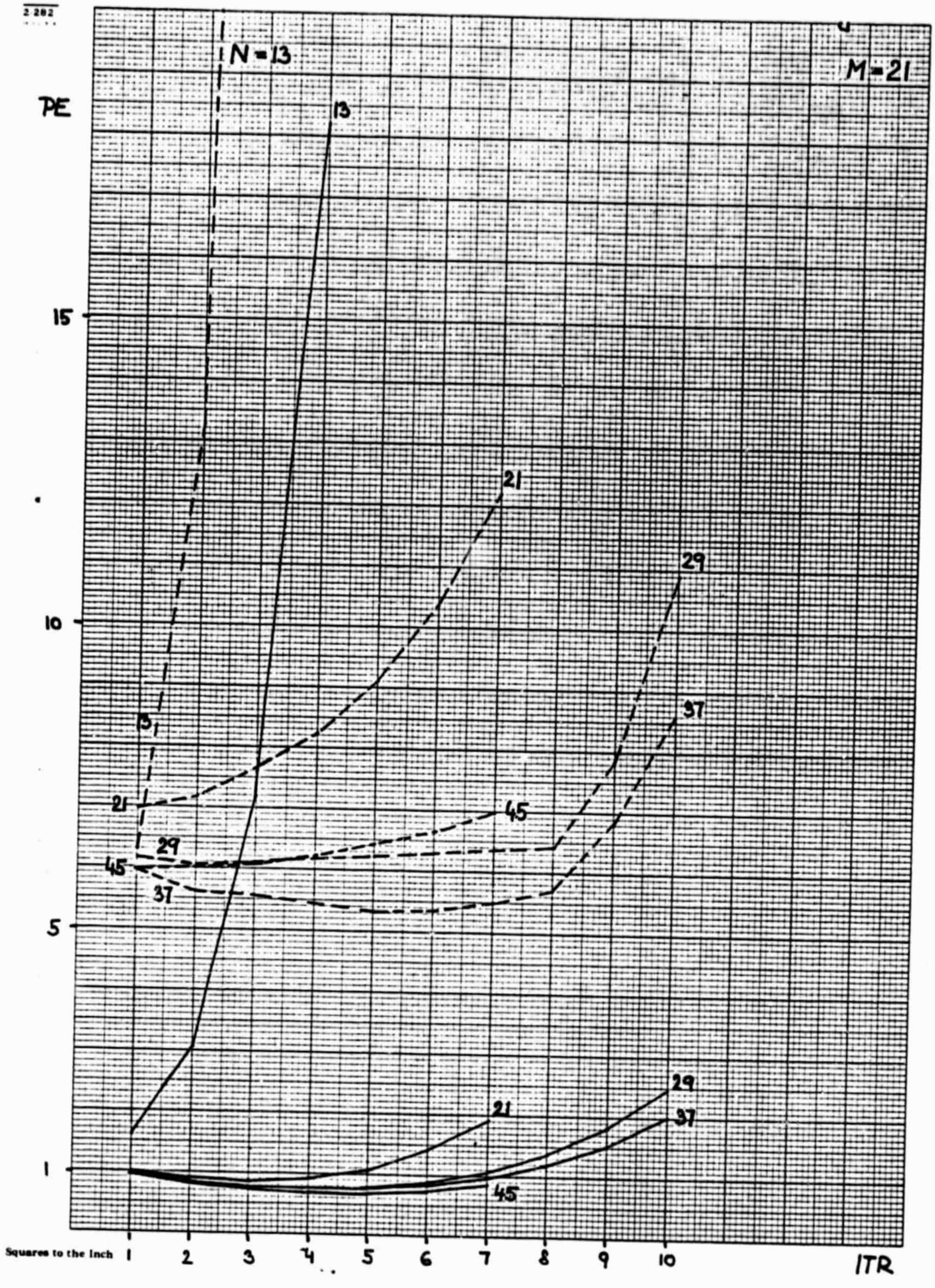
M = 21
PE
9
8
7
6
5
4
3
2
1
13
21
29
45
37
21
21
29,37,45
0 Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3a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M = 21
PE
15
10
5
1
13
21
29
37
45
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3b

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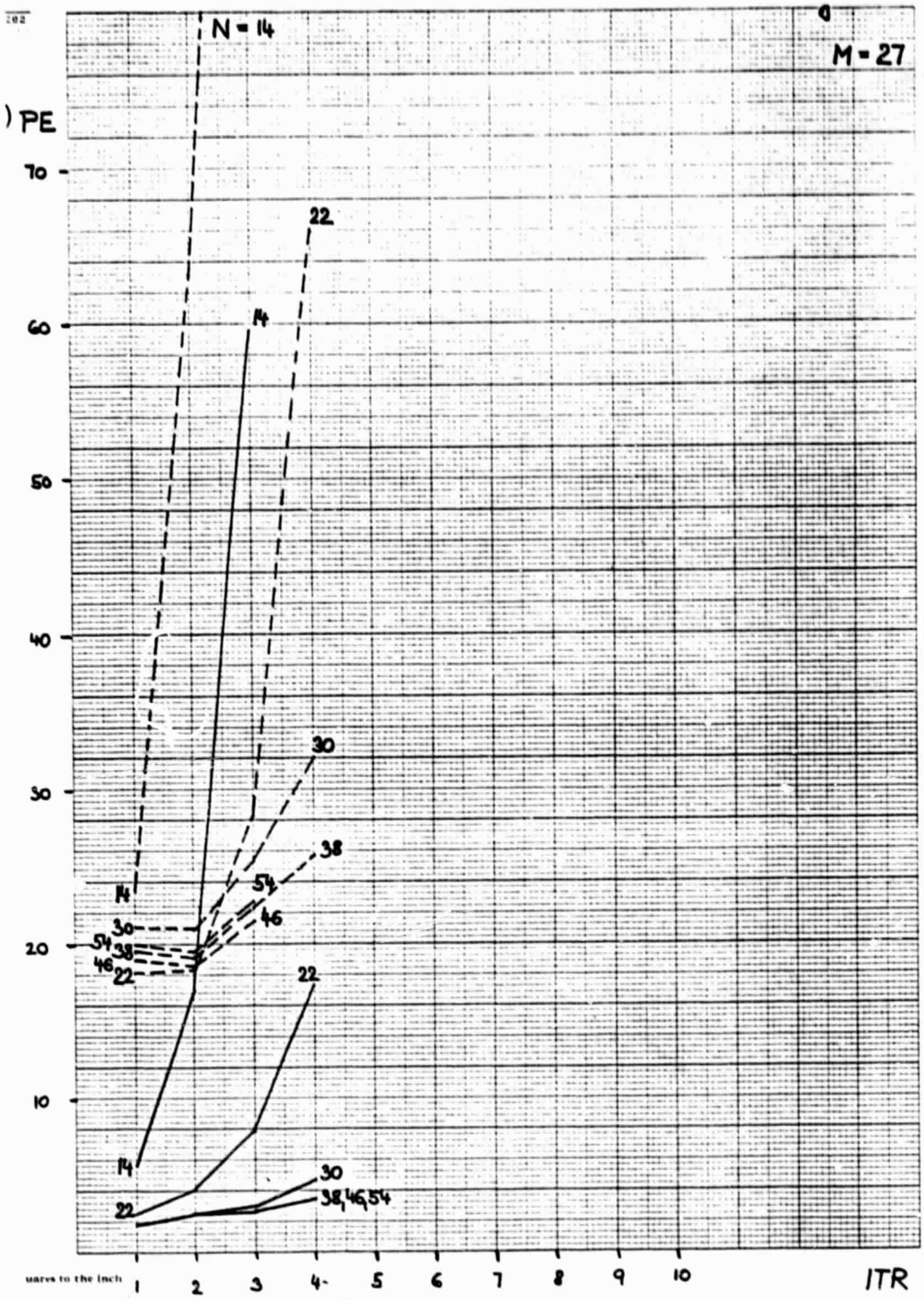
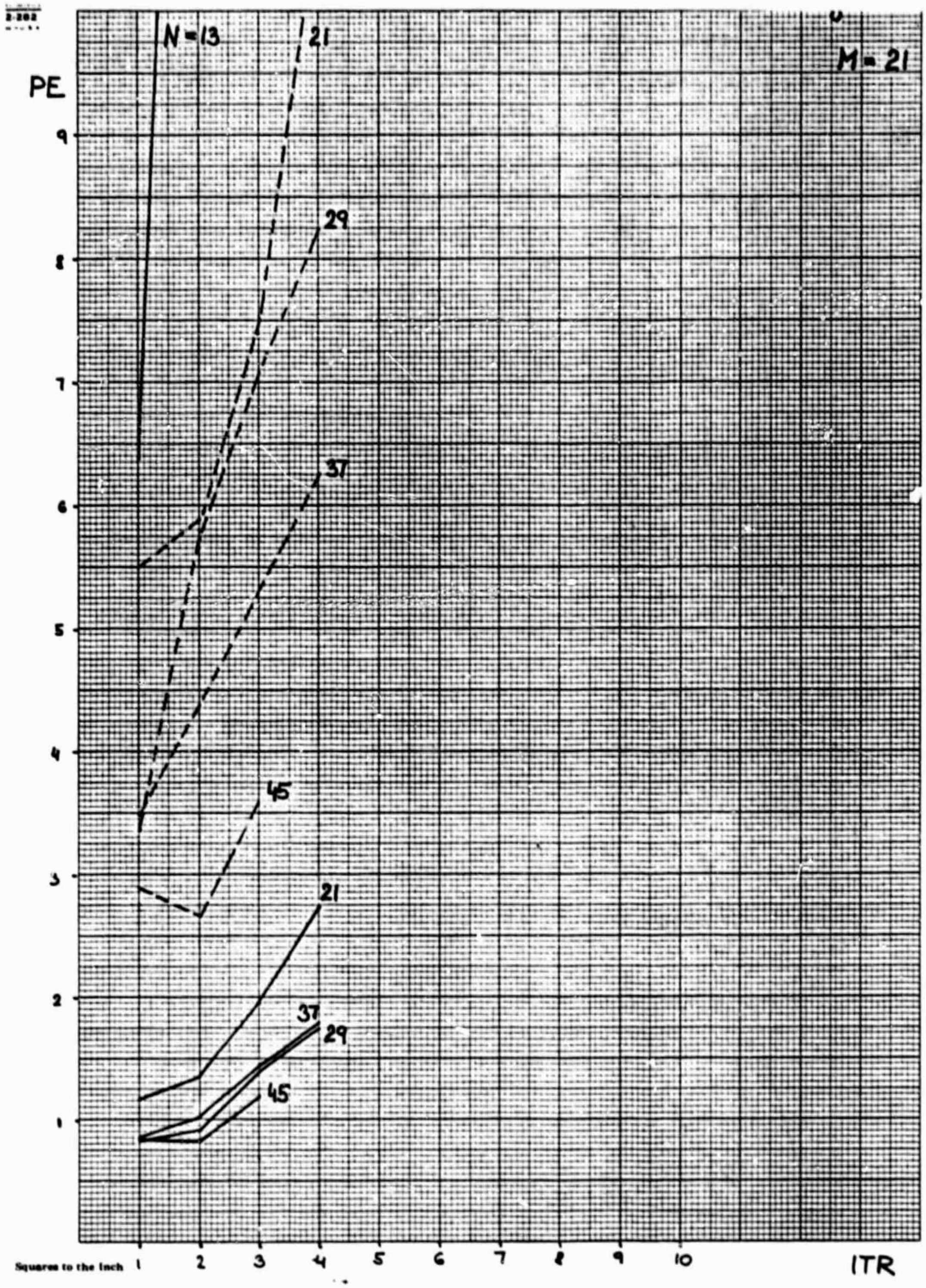


Figure 3c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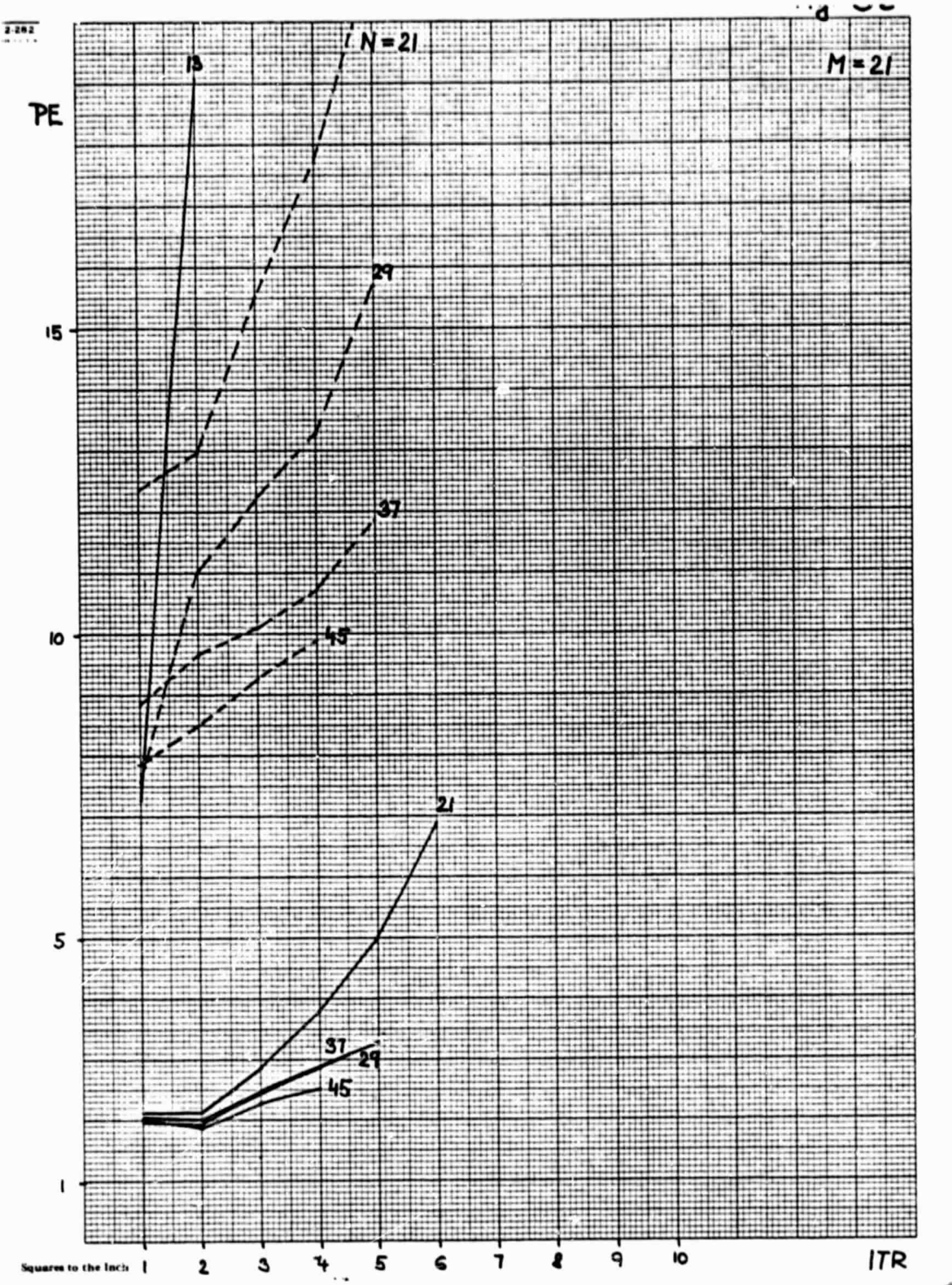
21
M = 21
PE
9
8
7
6
5
4
3
2
1
29
37
45
21
37
29
45
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3d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M = 21
13
PE
29
37
45
21
37
29
45
15
10
5
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3e

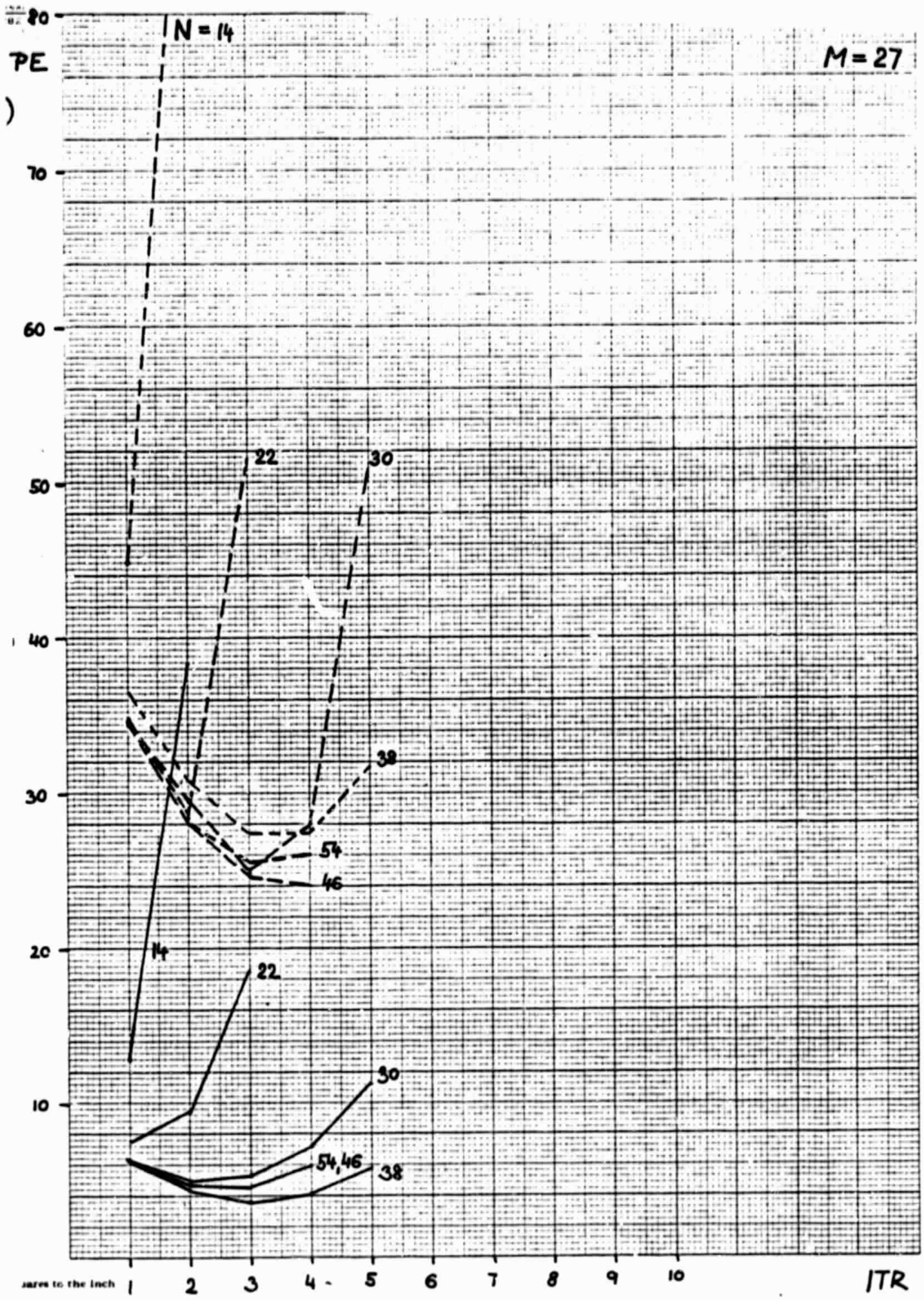
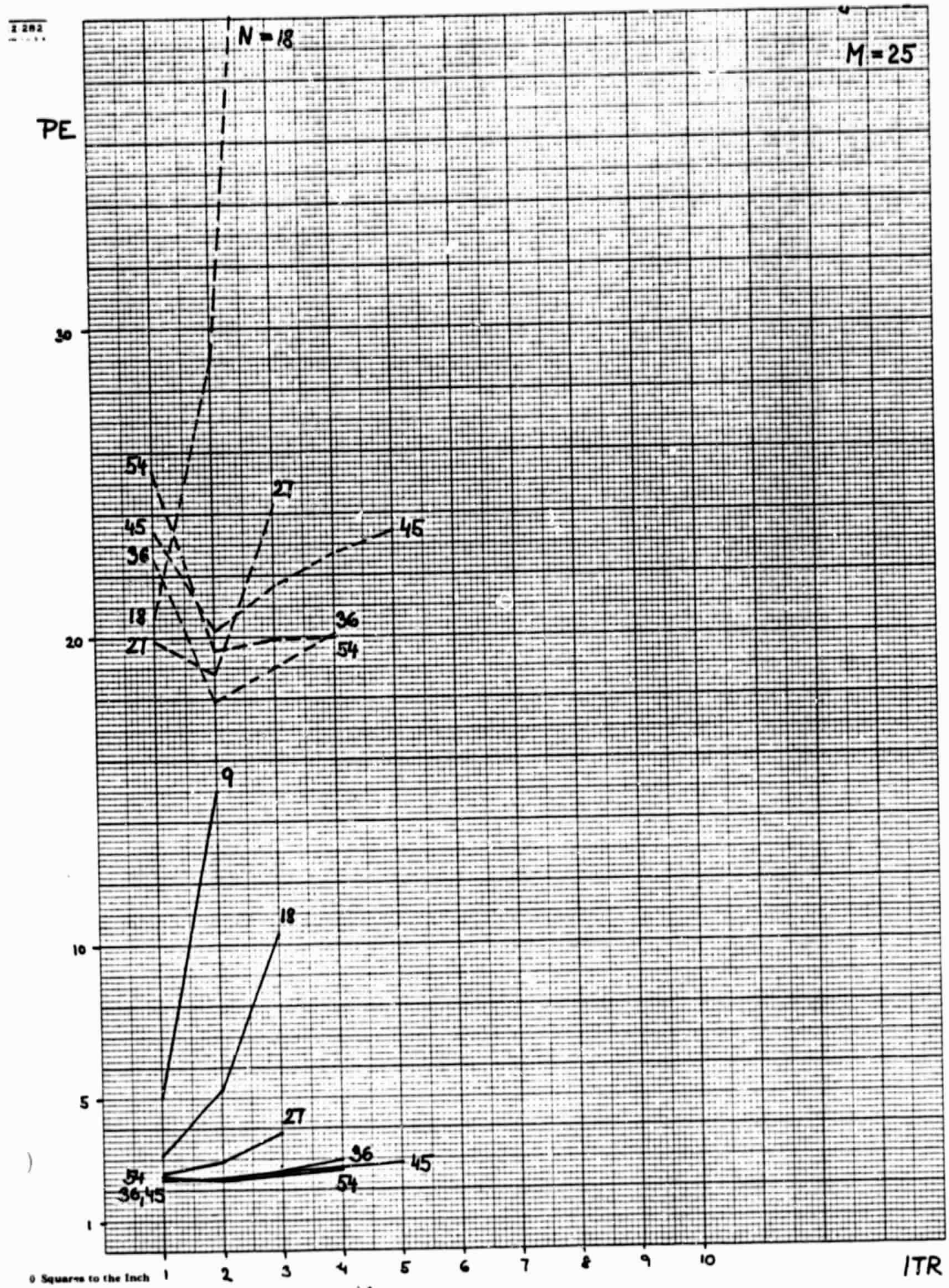

PE
)
80
70
60
50
40
30
20
10
N = 14
M = 27
22
30
38
54
46
14
22
30
54, 46
38
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3f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M = 25
PE
30
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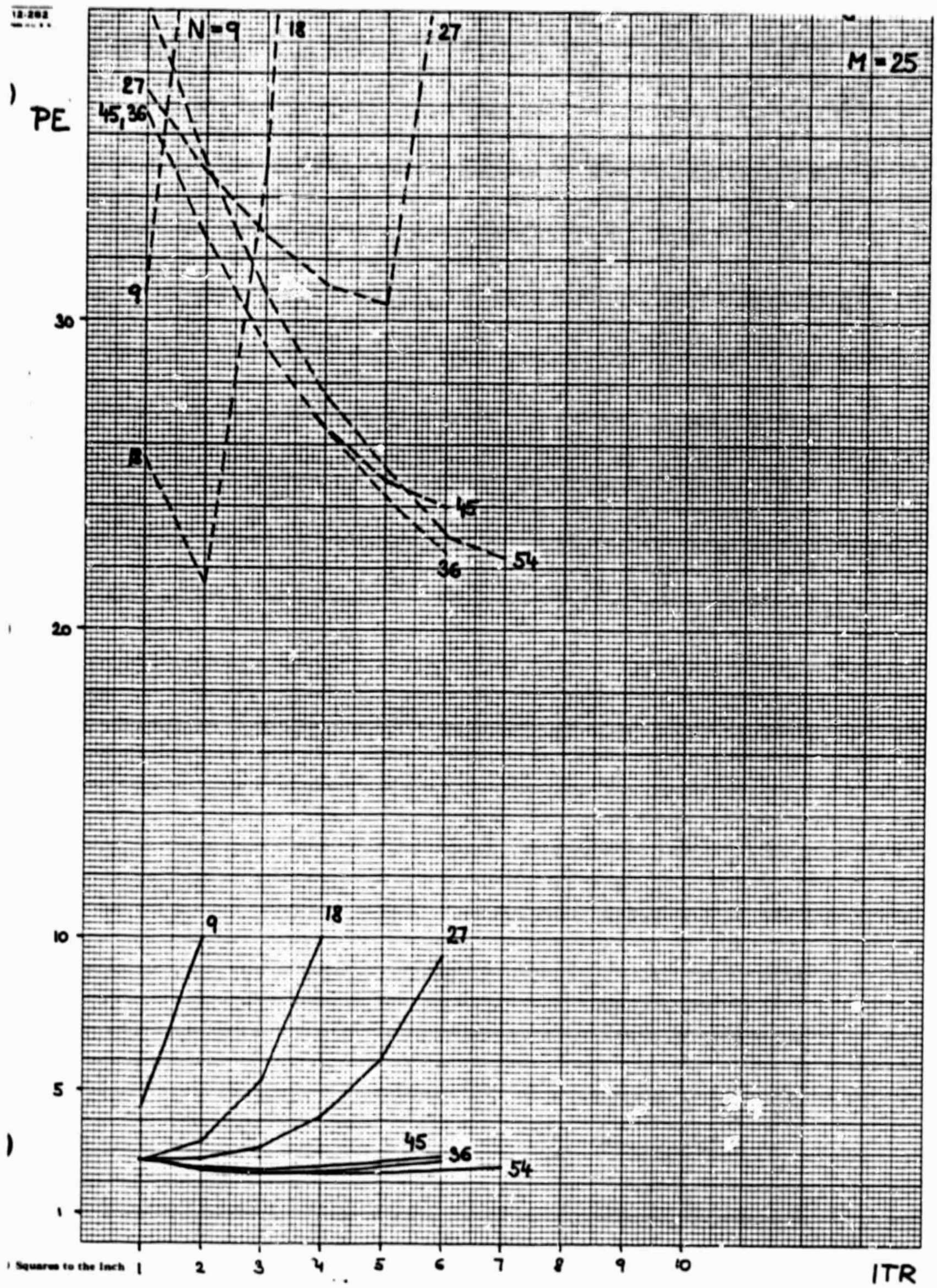
1
54
45
36
18
27
9
36,45
ITR
1
2
3
4
5
6
7
8
9
10
0 Squares to the Inch

Figure 3g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18
27
M = 25
PE
27
45, 36
9
30
18
45
36
54
20
10
9
18
27
5
45
36
54
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3h

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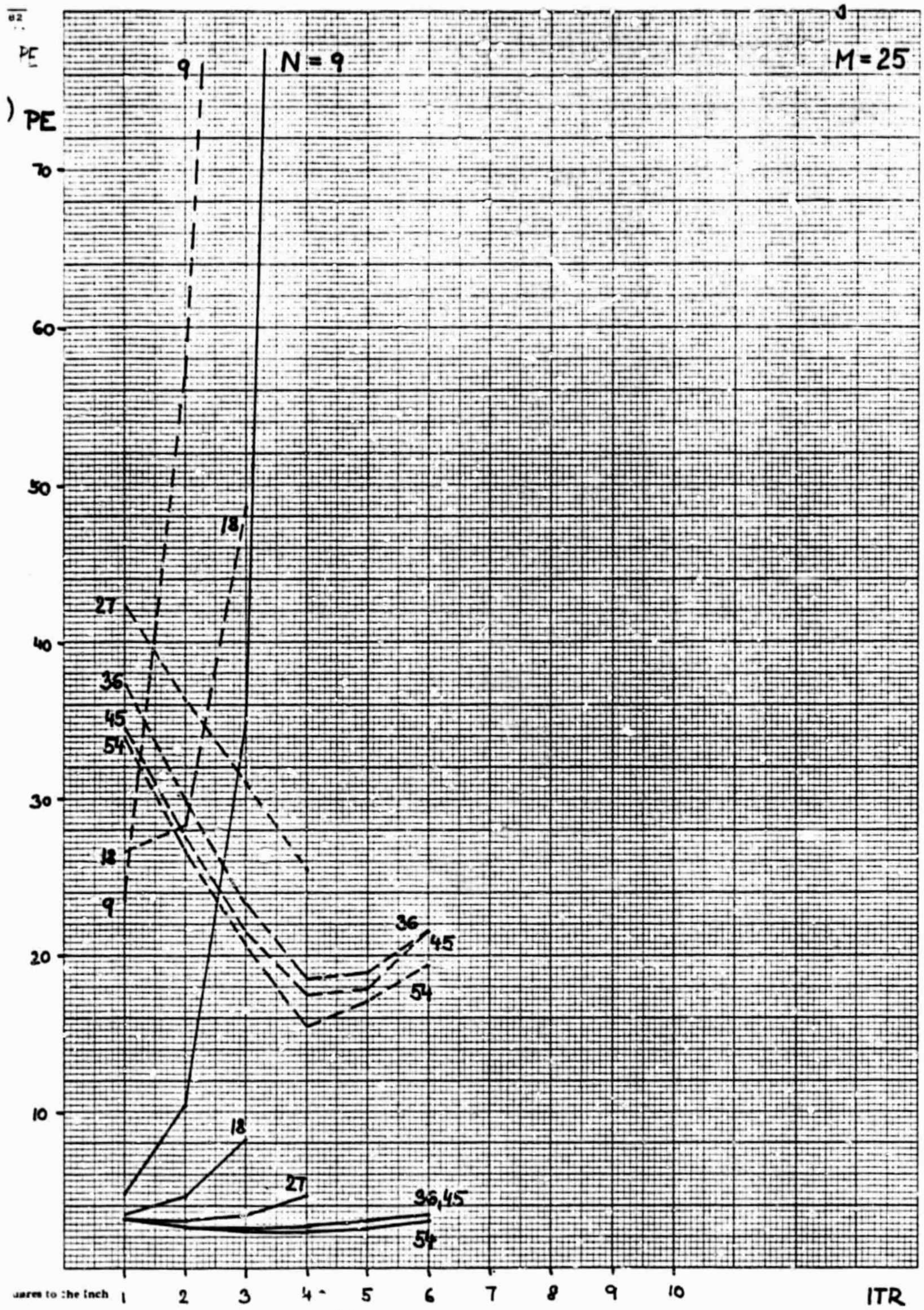
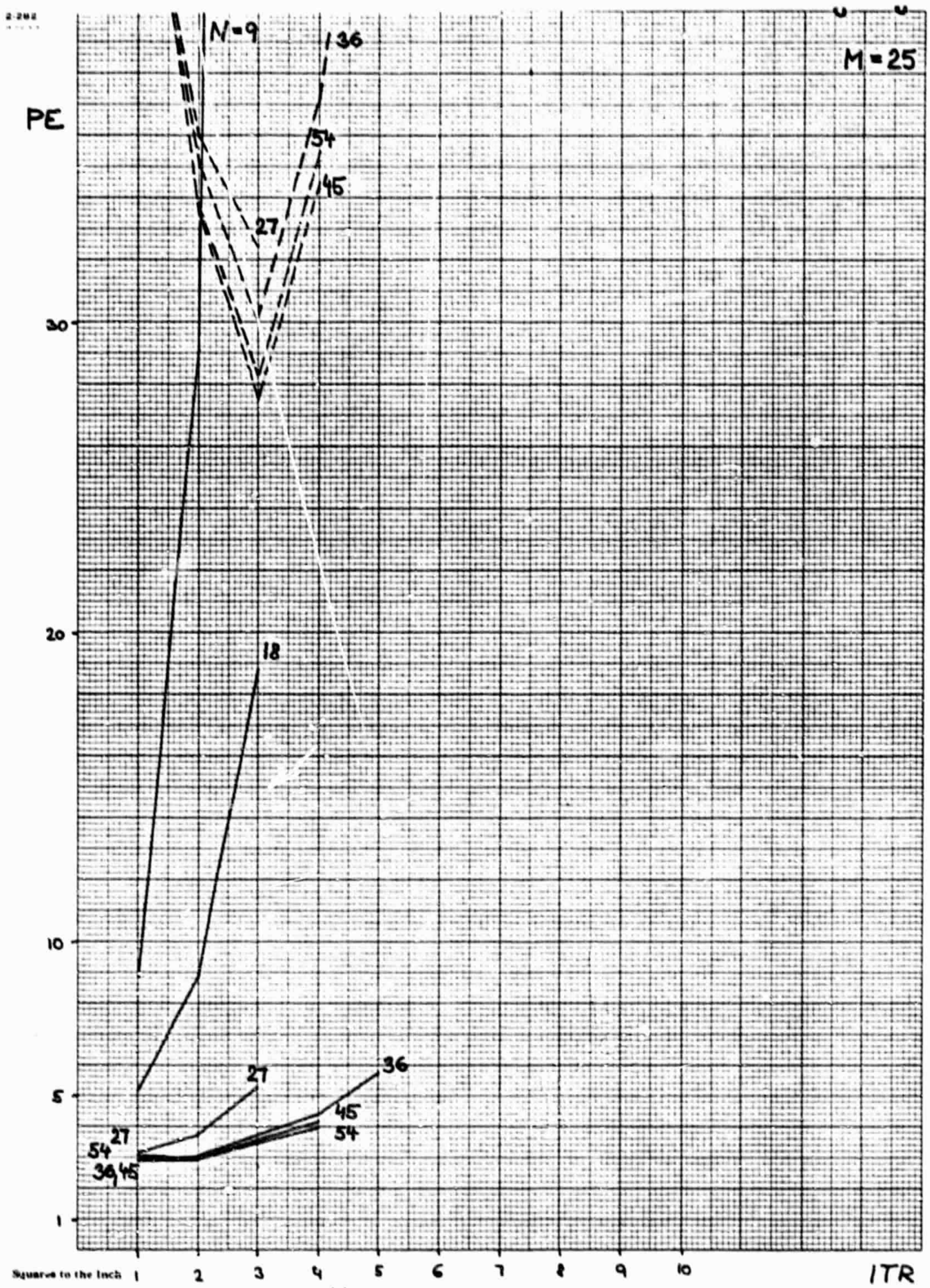


Figure 3i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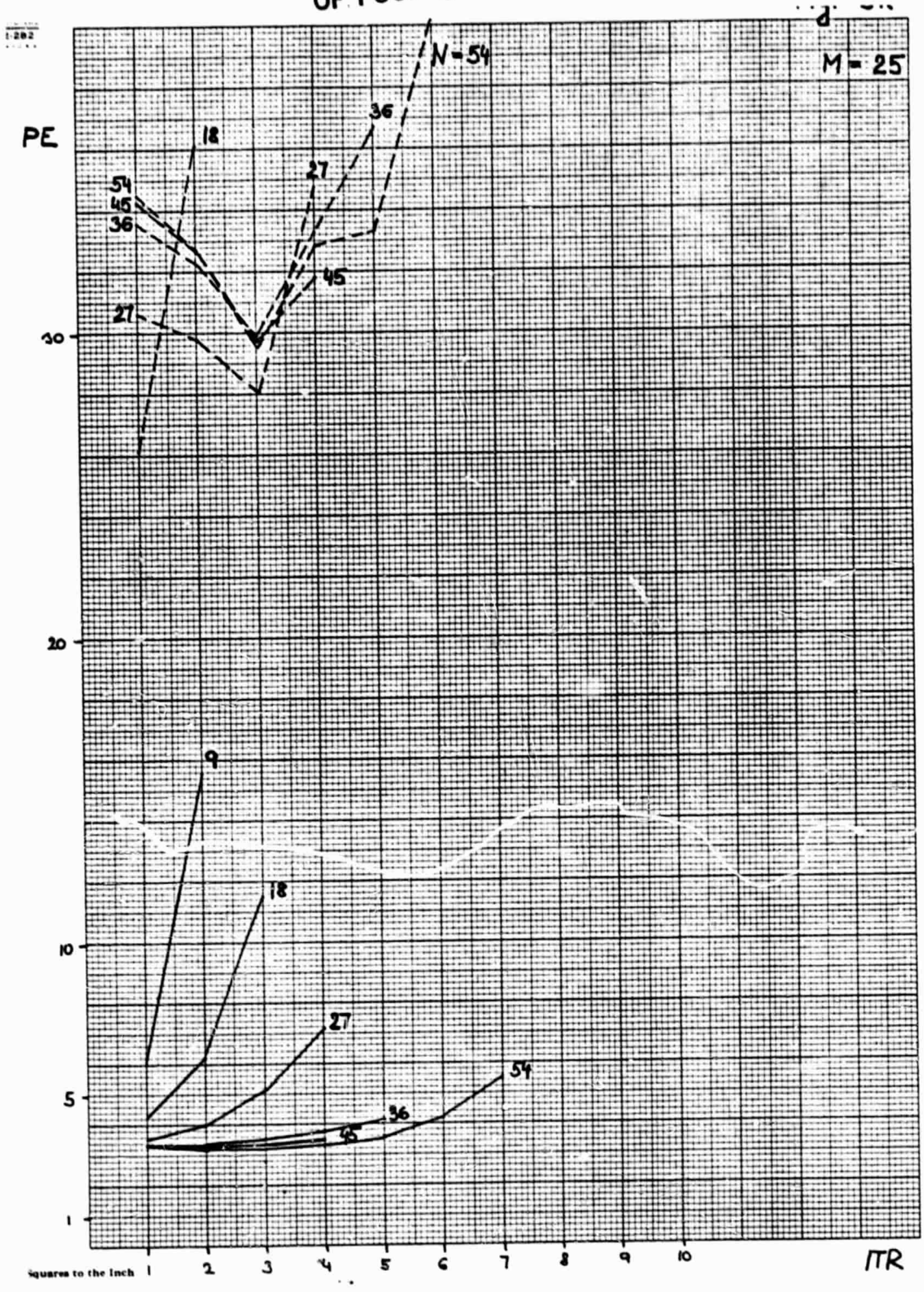
M=25
PE
54
45
27
30
20
18
10
27
36
5
45
27
54
54
36
45
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3j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PE
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36
27
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30
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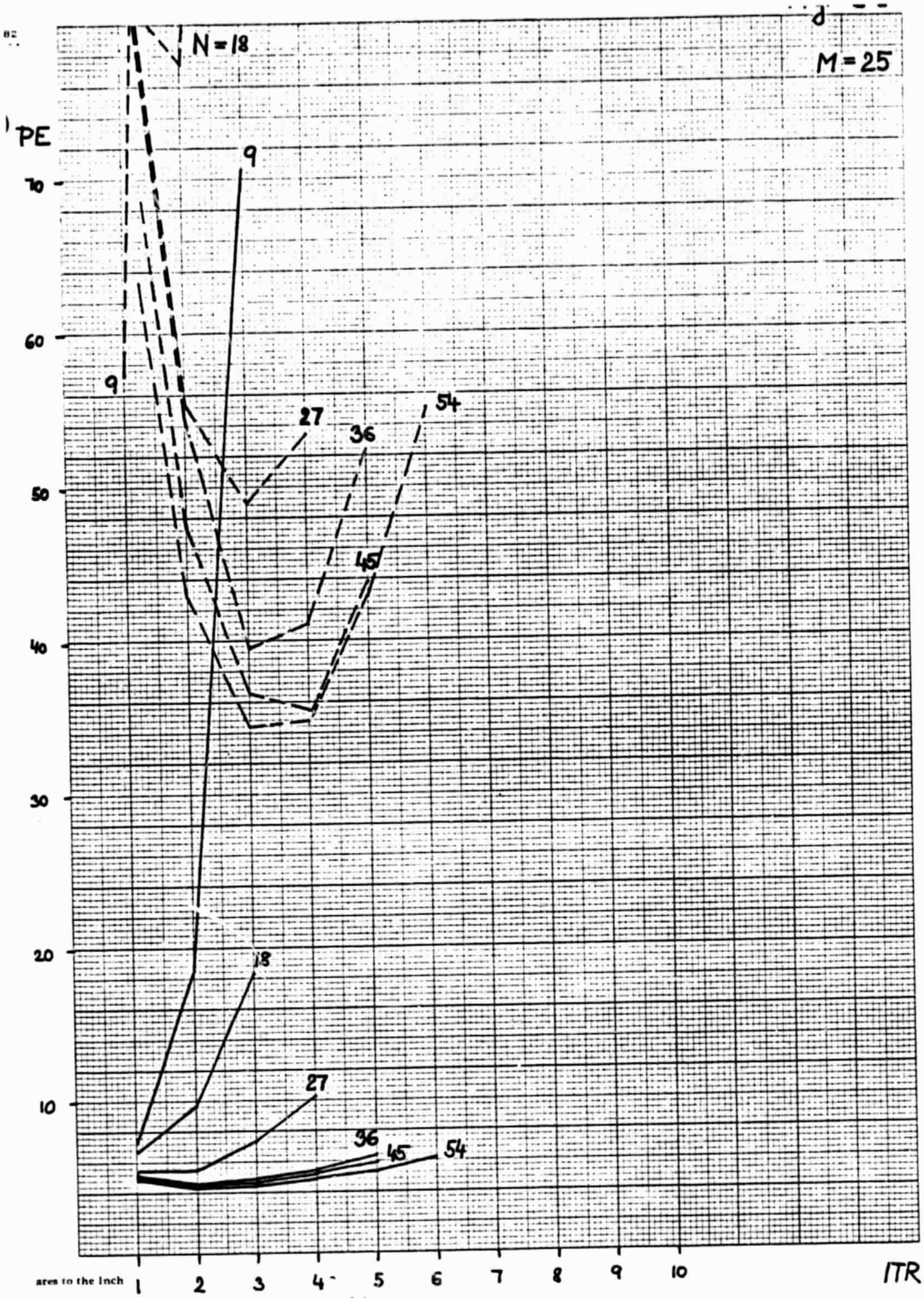
9
18
10
27
54
36
45
5
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3k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PE
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9
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54
1
2
3
4
5
6
7
8
9
10
ITR

Figure 3ℓ

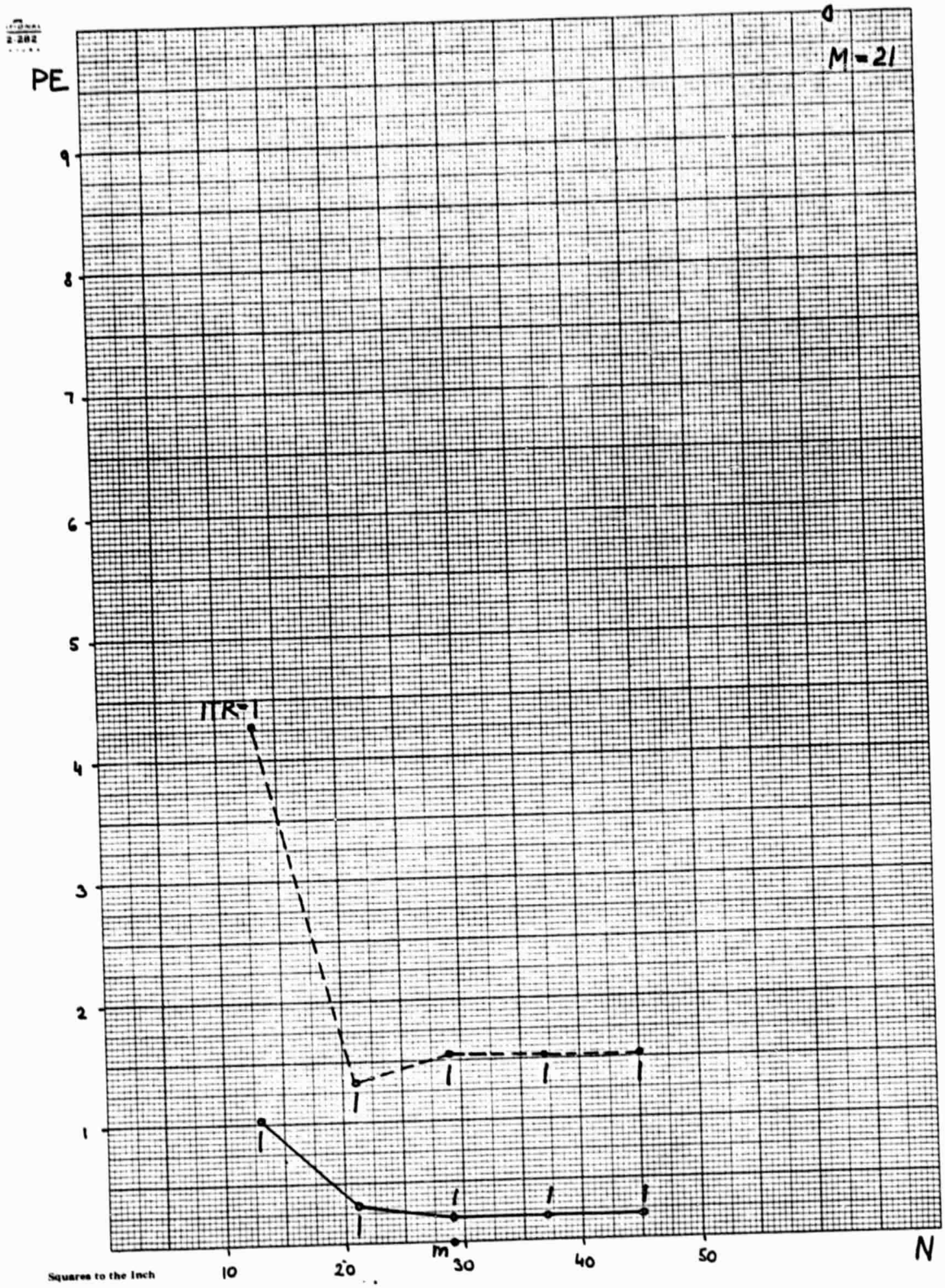
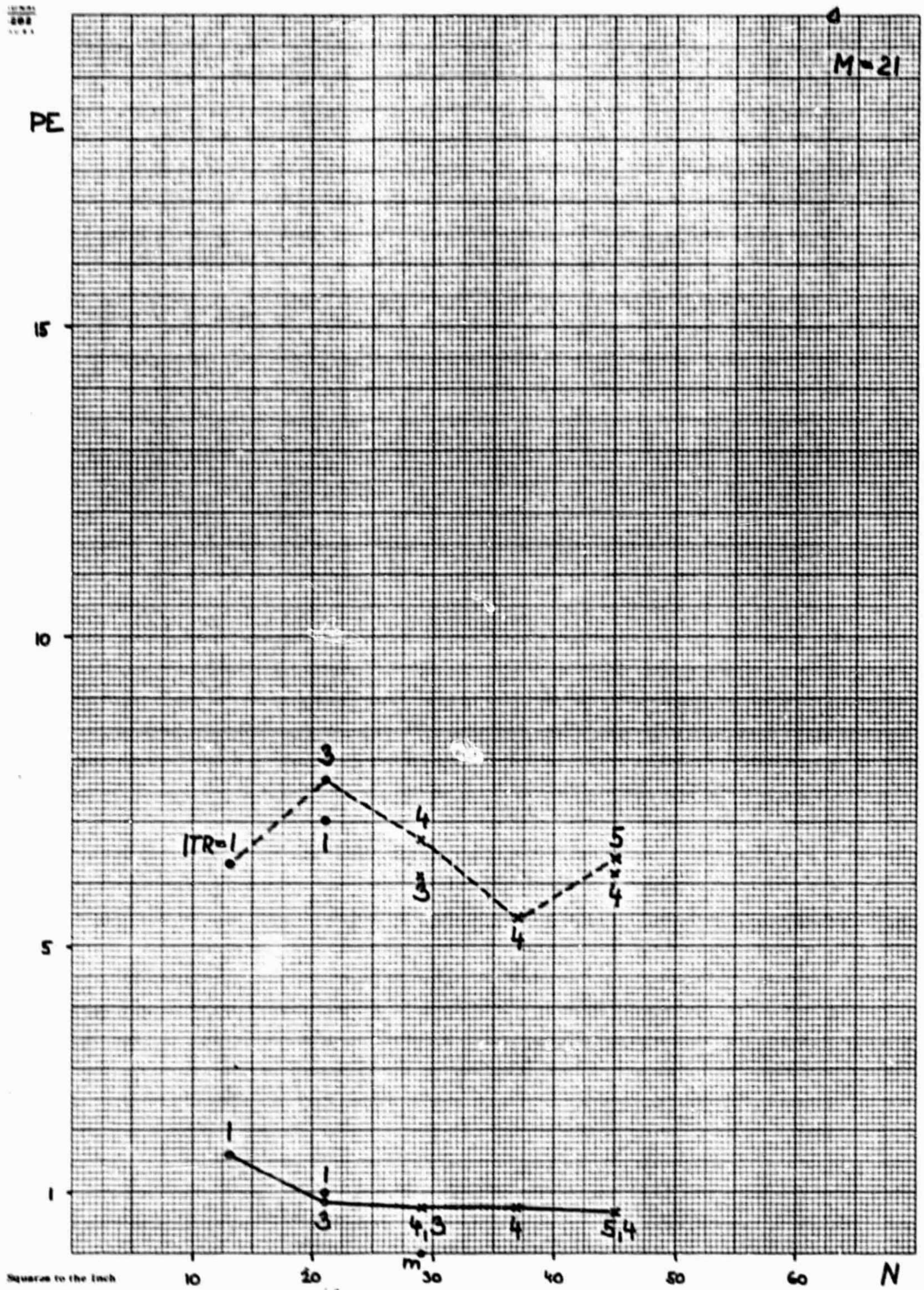


Figure 4a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PE
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10
5
1
ITR=1
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1
4
3
4
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4,3
4
5,4
m
Squares to the Inch
10
20
30
40
50
60
N

Figure 4b

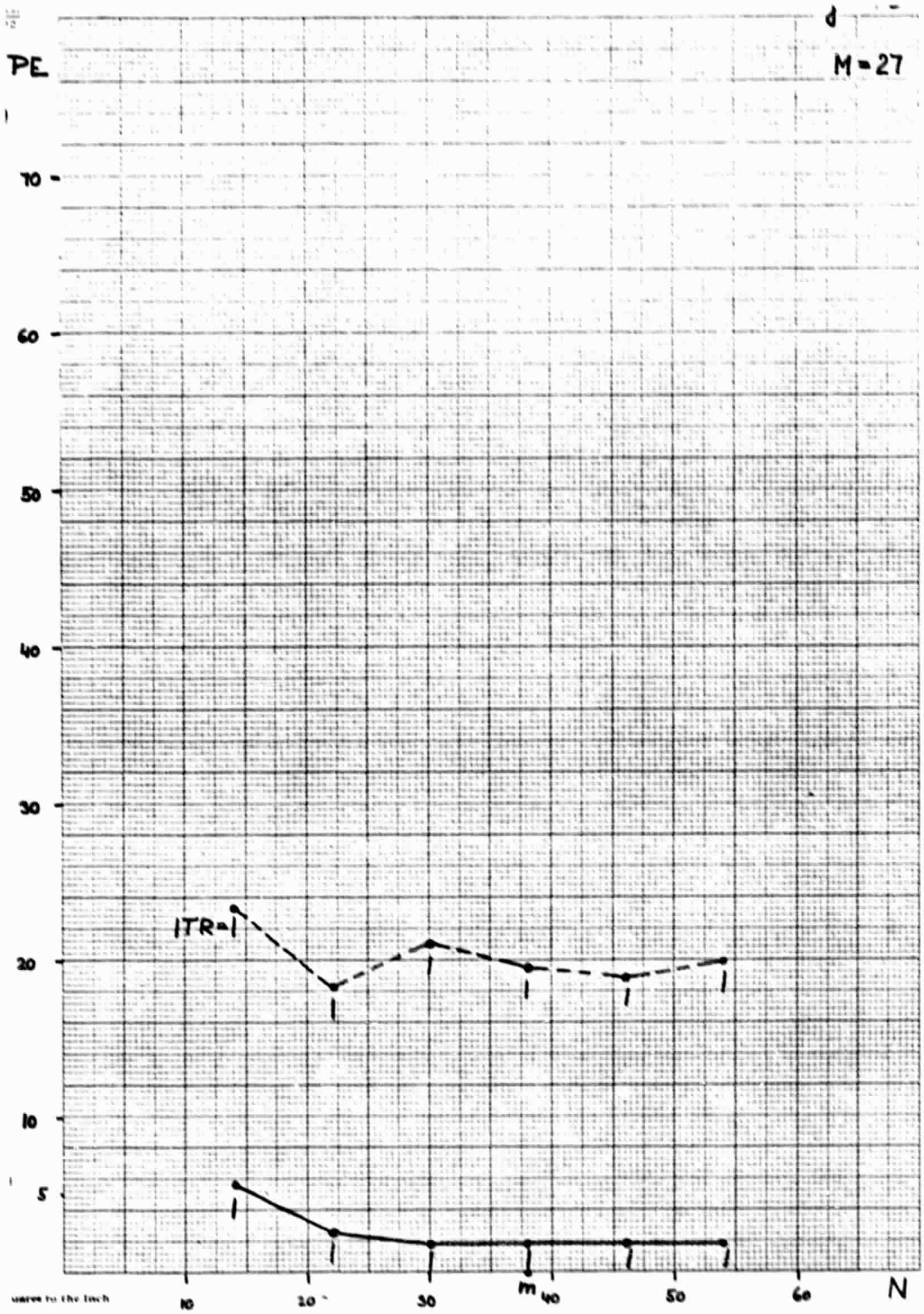

Figure 4c

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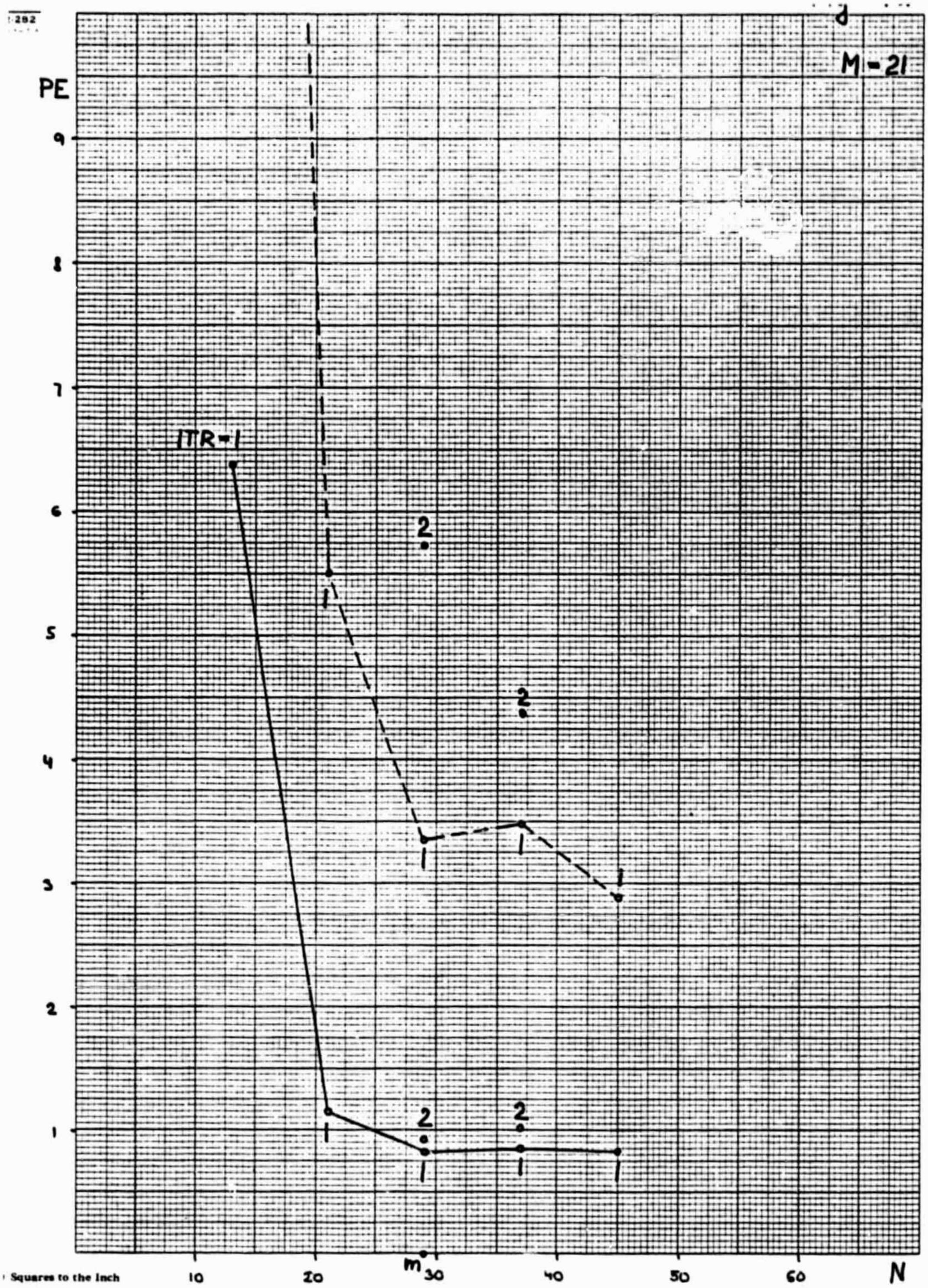
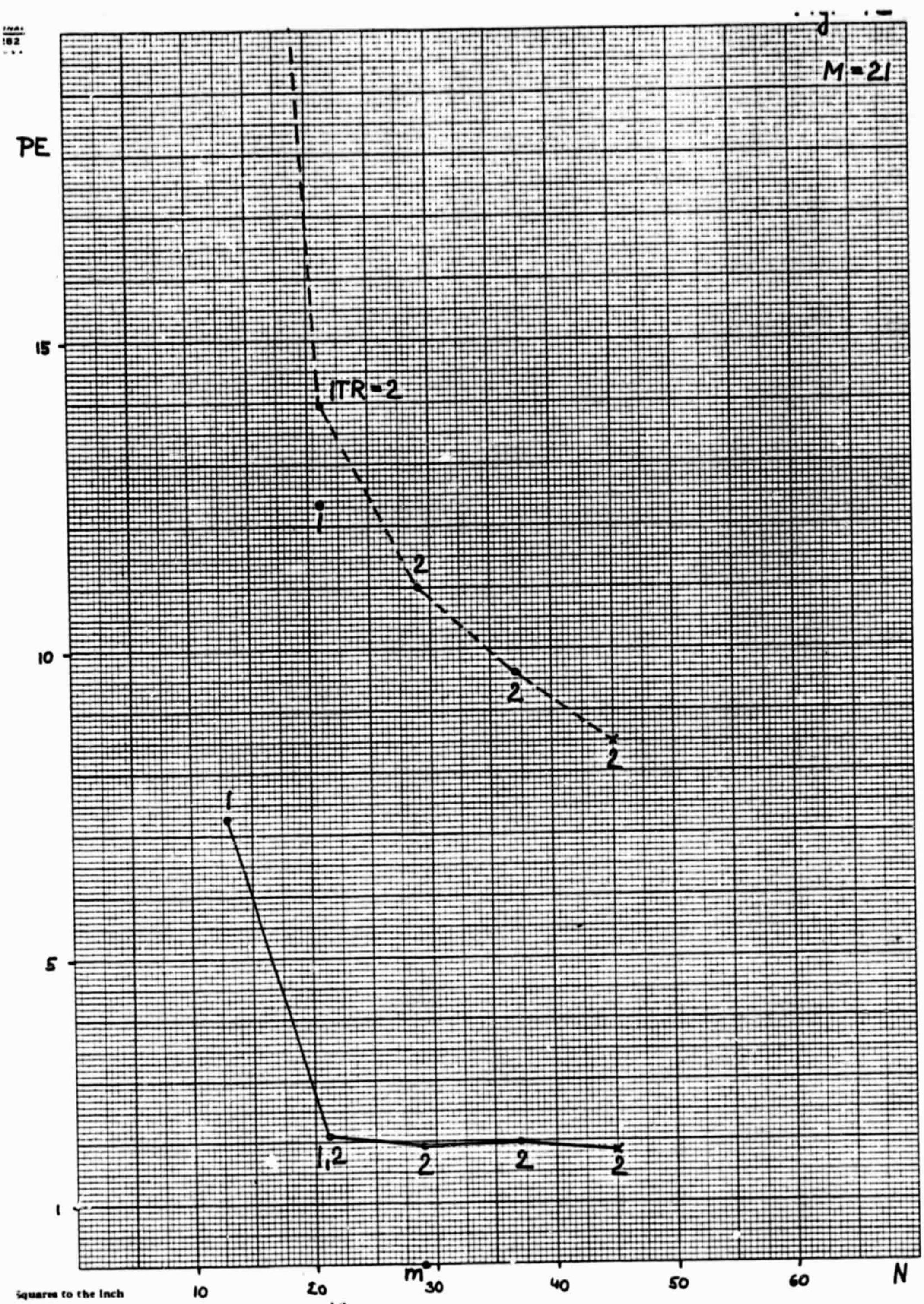


Figure 4d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PE
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ITR=2
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2
2
2
1
1,2
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2
2
Squares to the Inch
10
20
m
30
40
50
60
N

Figure 4e

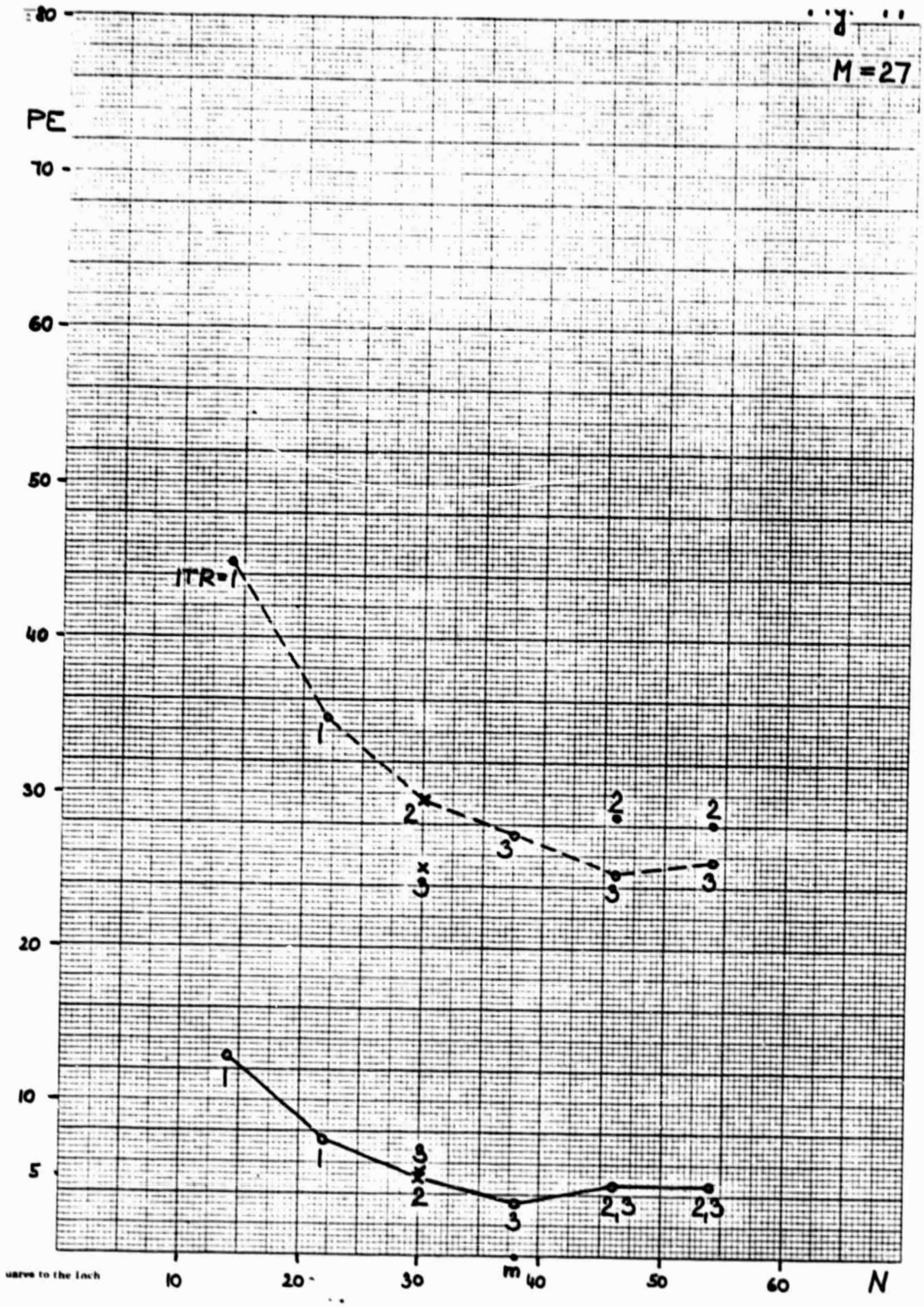


Figure 4f

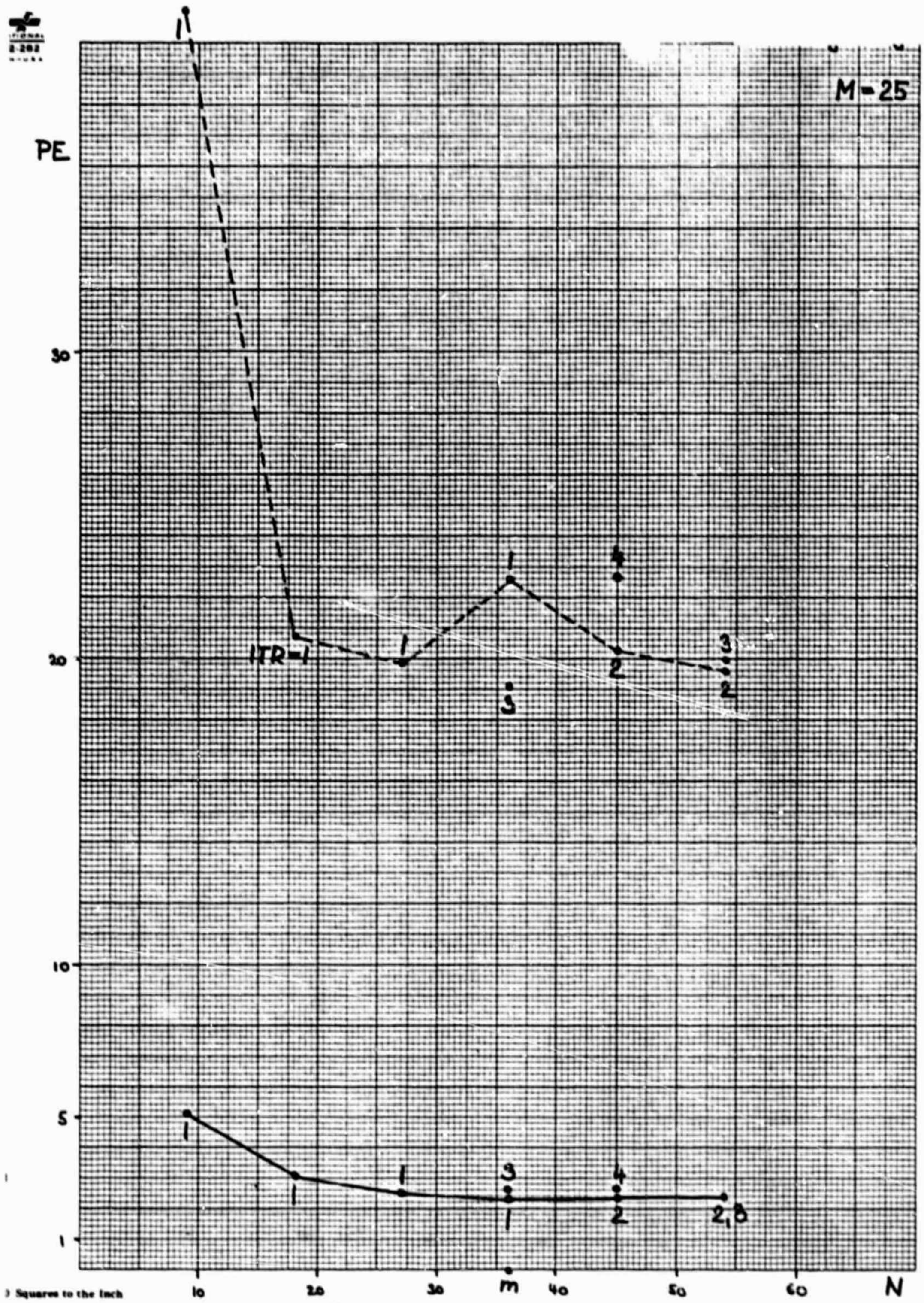
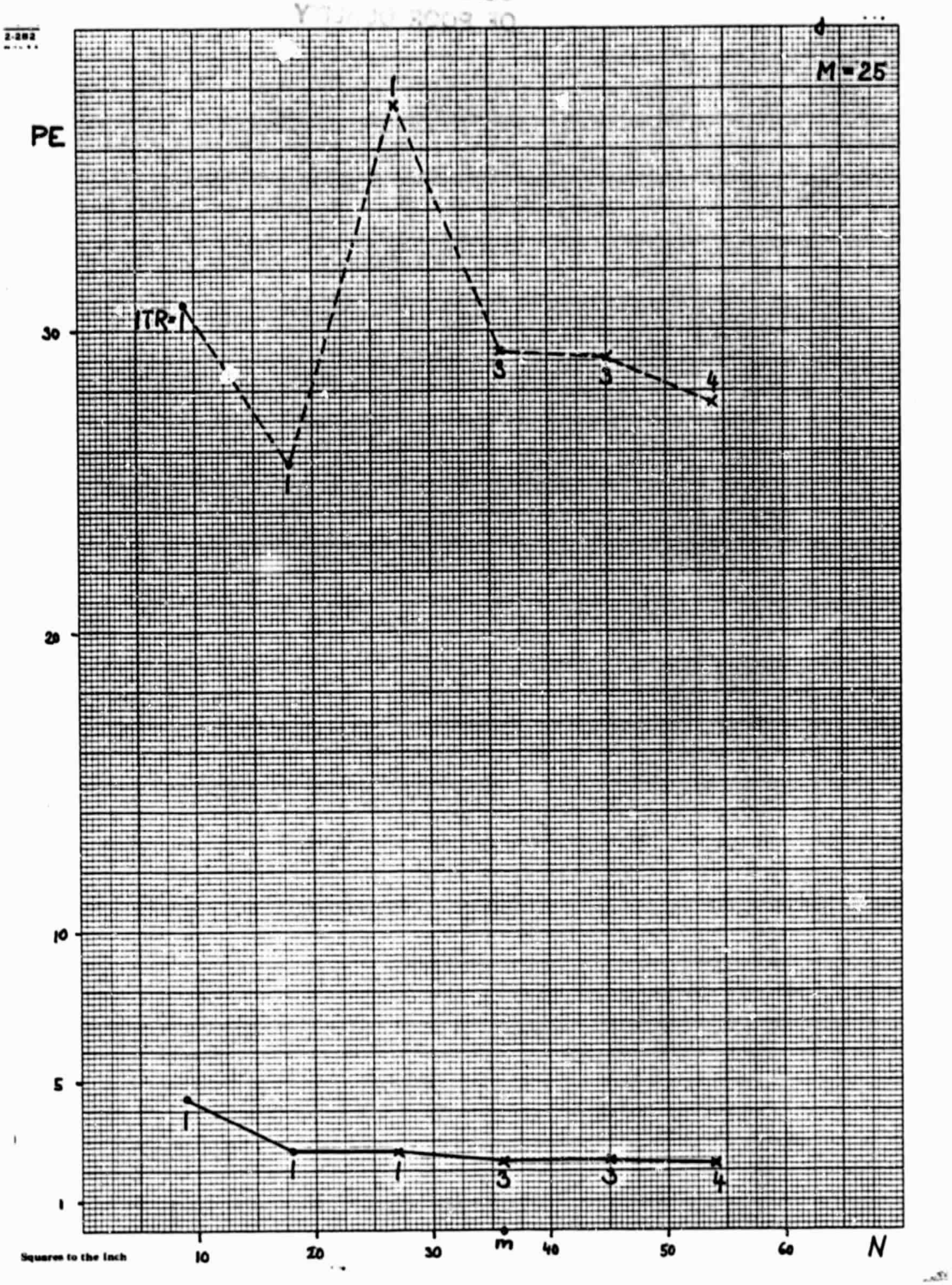


Figure 4g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PE
ITR=1
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3
3
4
1
1
1
3
3
4
Squares to the Inch
10
20
30
m
40
50
60
N

Figure 4h

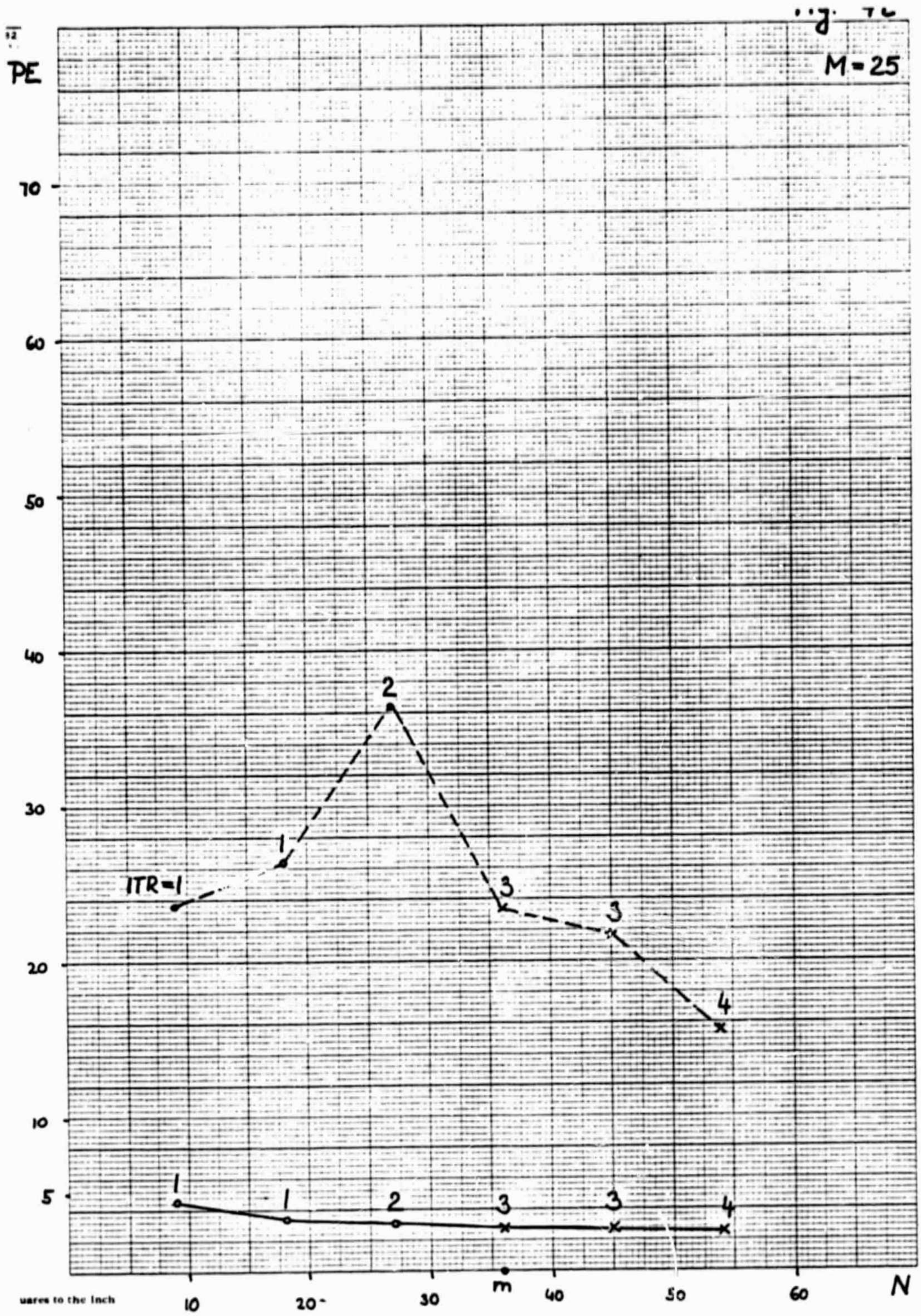

M=25
PE
70
60
50
40
30
20
10
5
ITR=1
1
1
2
3
3
4
1
1
2
3
3
4
10
20
30
m
40
50
60
N

Figure 4i

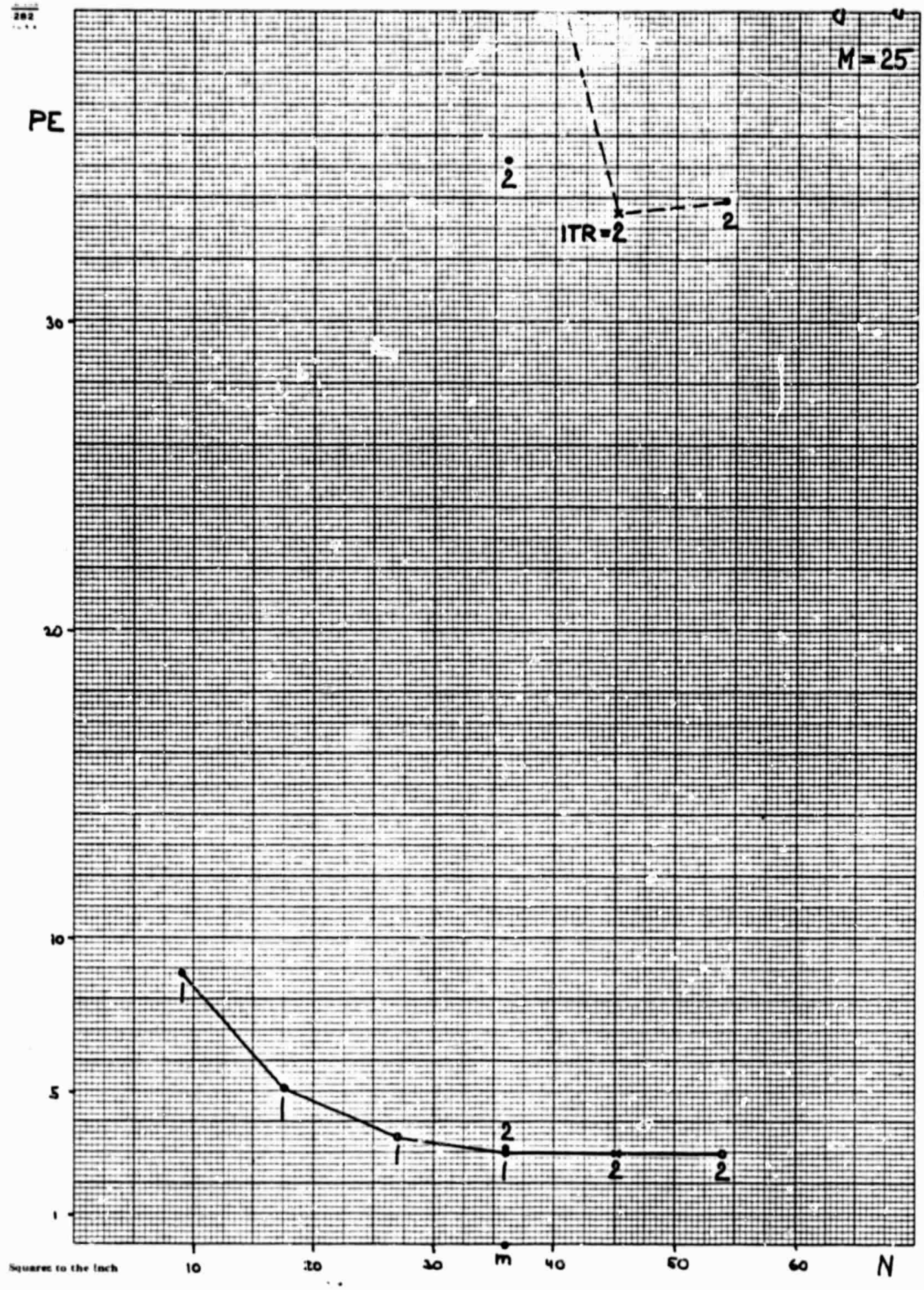


Figure 4j

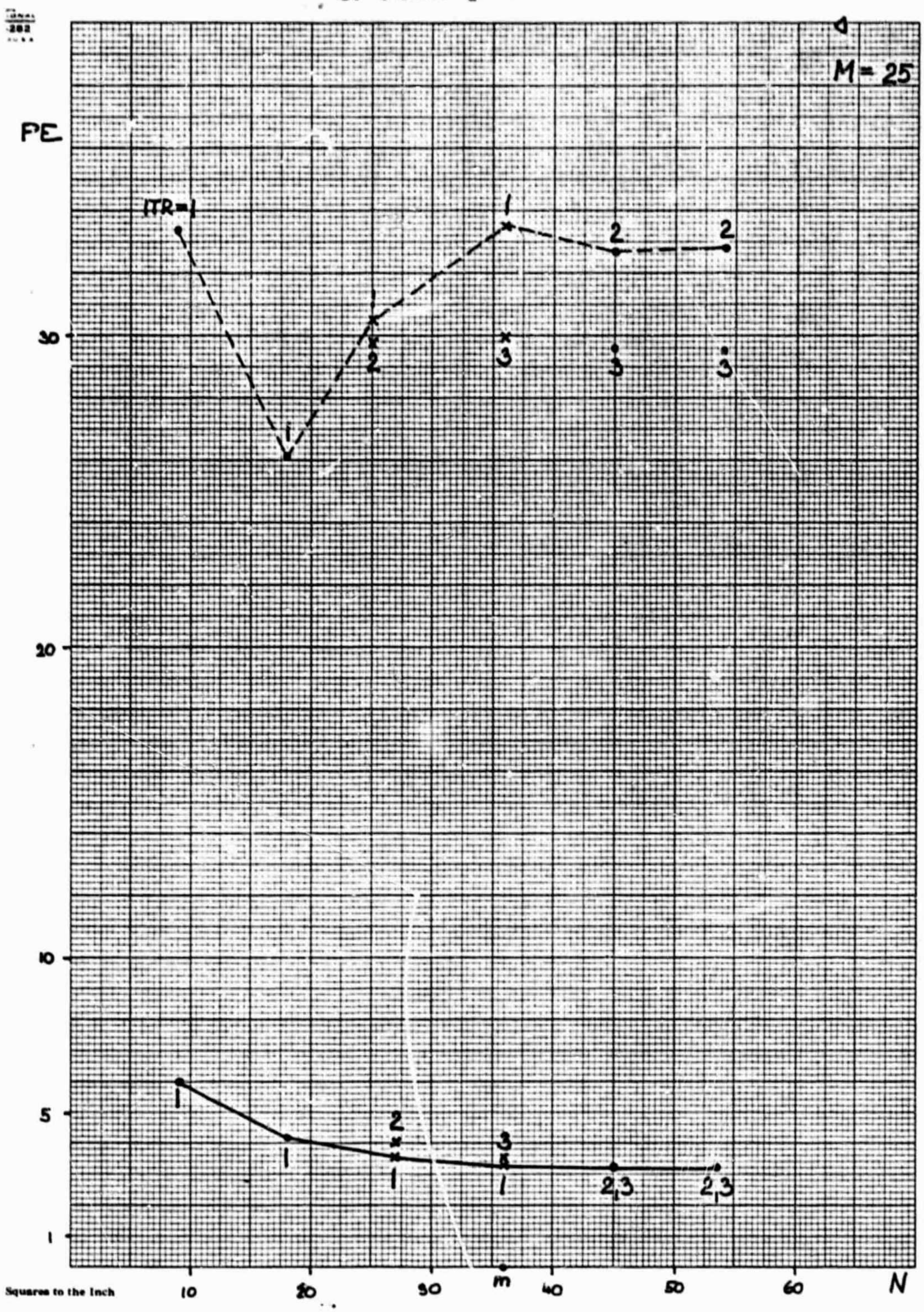
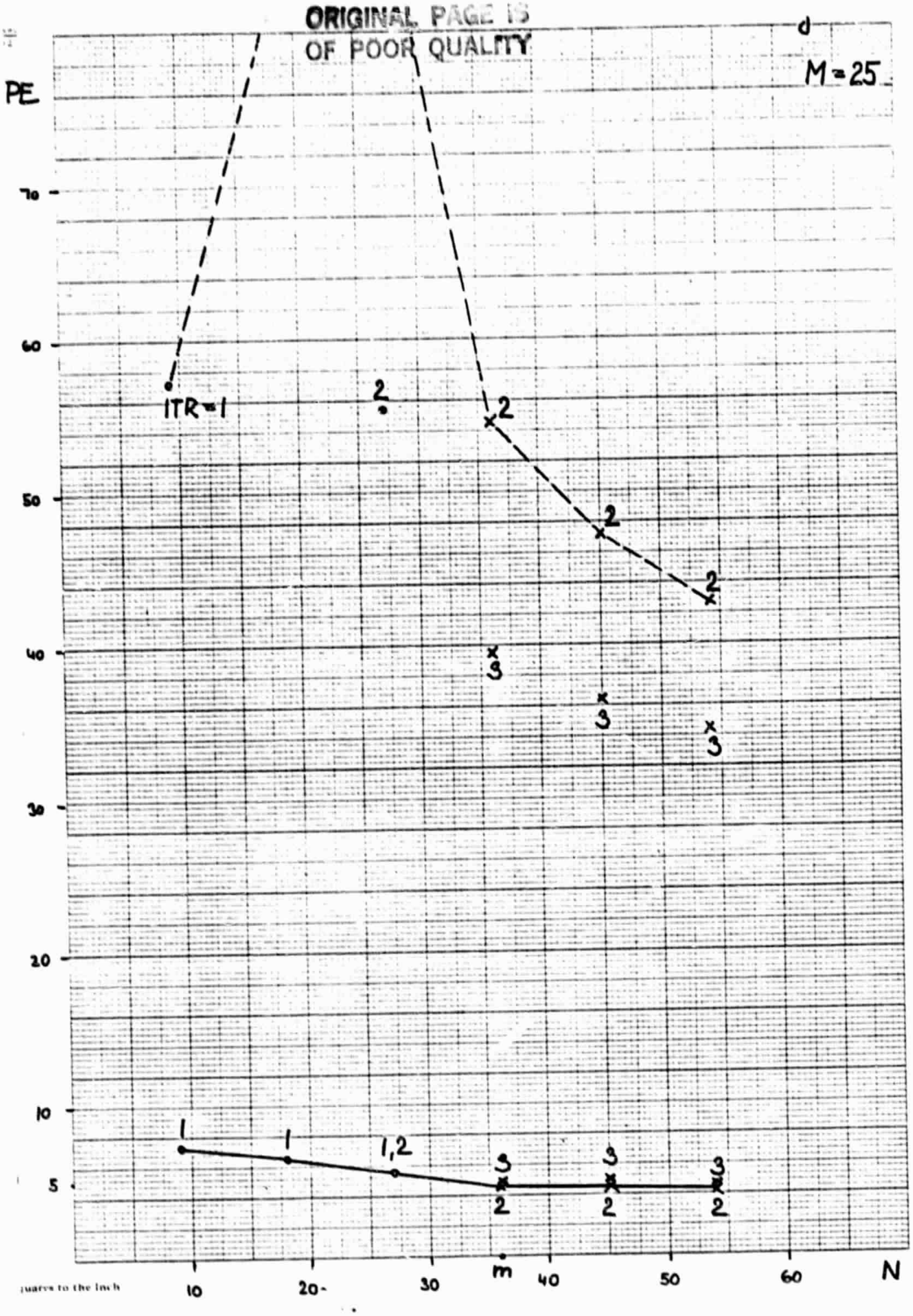

M = 25
PE
ITR = 1
30
20
10
5
1
Squares to the Inch
10
20
30
m
40
50
60
N
1
2
3
2,3

Figure 4k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d
M = 25
PE
70
60
50
40
30
20
10
5
ITR = 1
2
1
1,2
3
m
10
20
30
40
50
60
N

Figure 4ℓ

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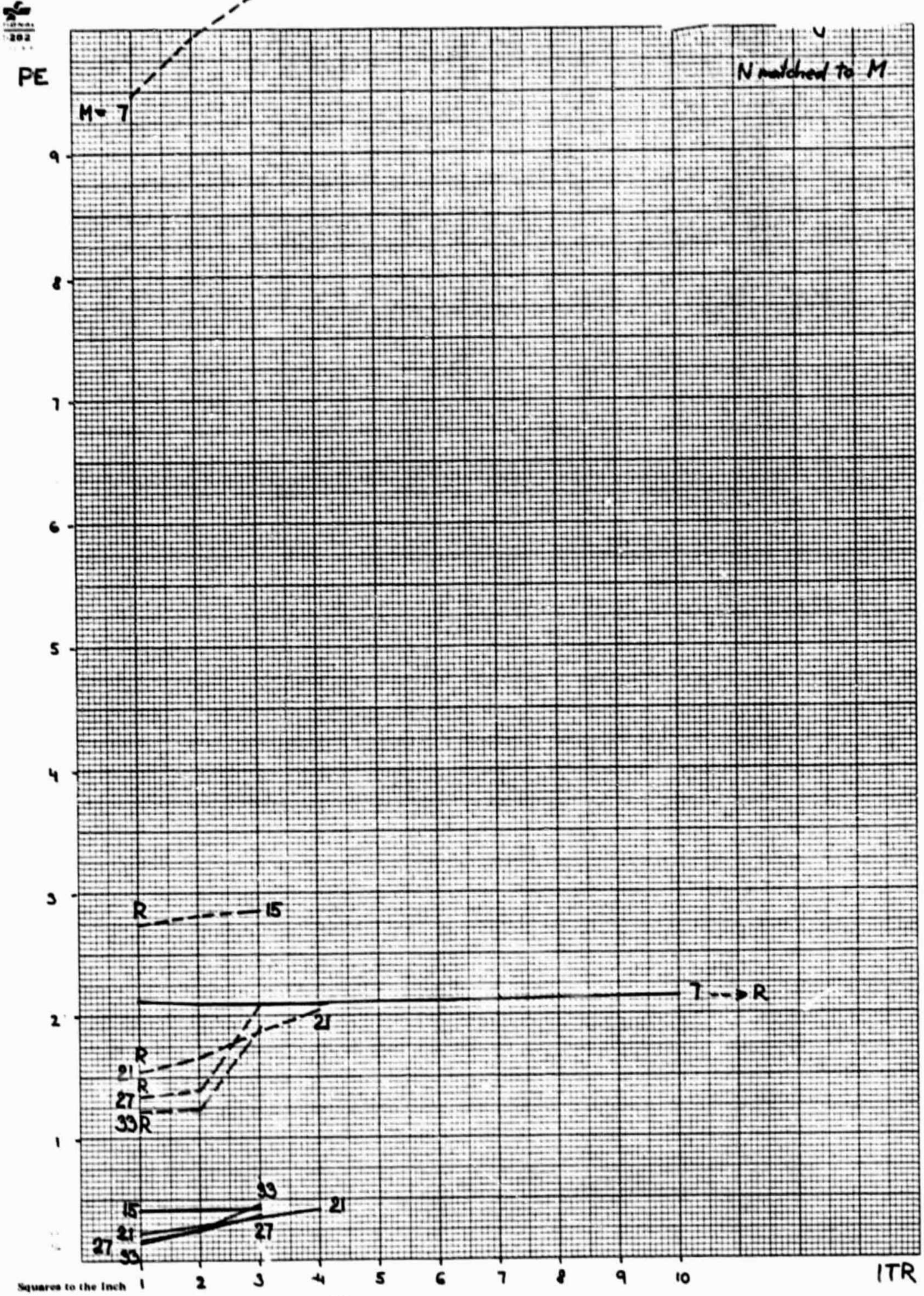

Figure 5a

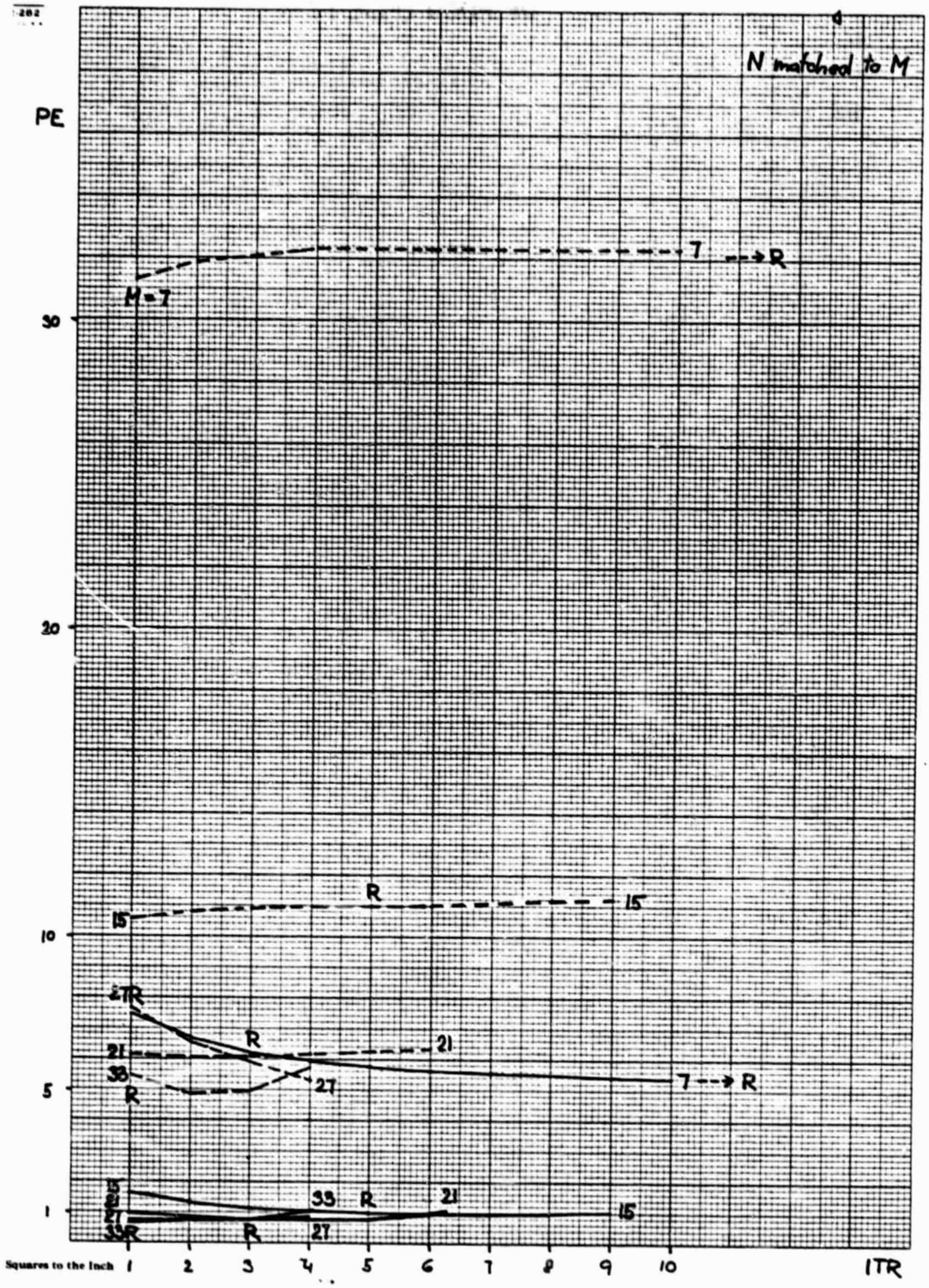
N matched to M
PE
30
20
10
5
1
M=7
7
R
15
R
15
21
R
21
33
R
27
7 --> R
15
21
27
33R
33
R
21
15
R
27
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5b

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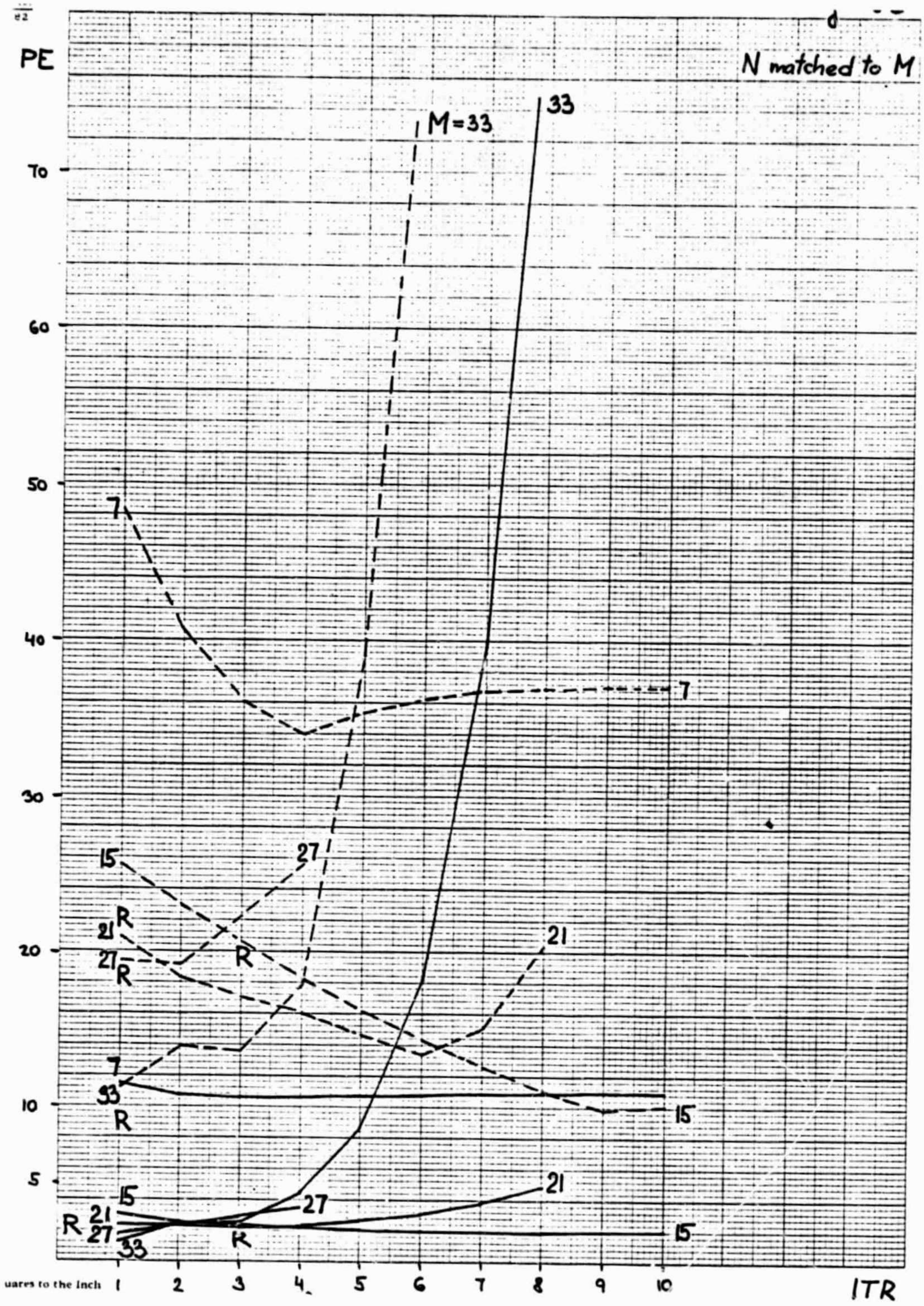

Figure 5c

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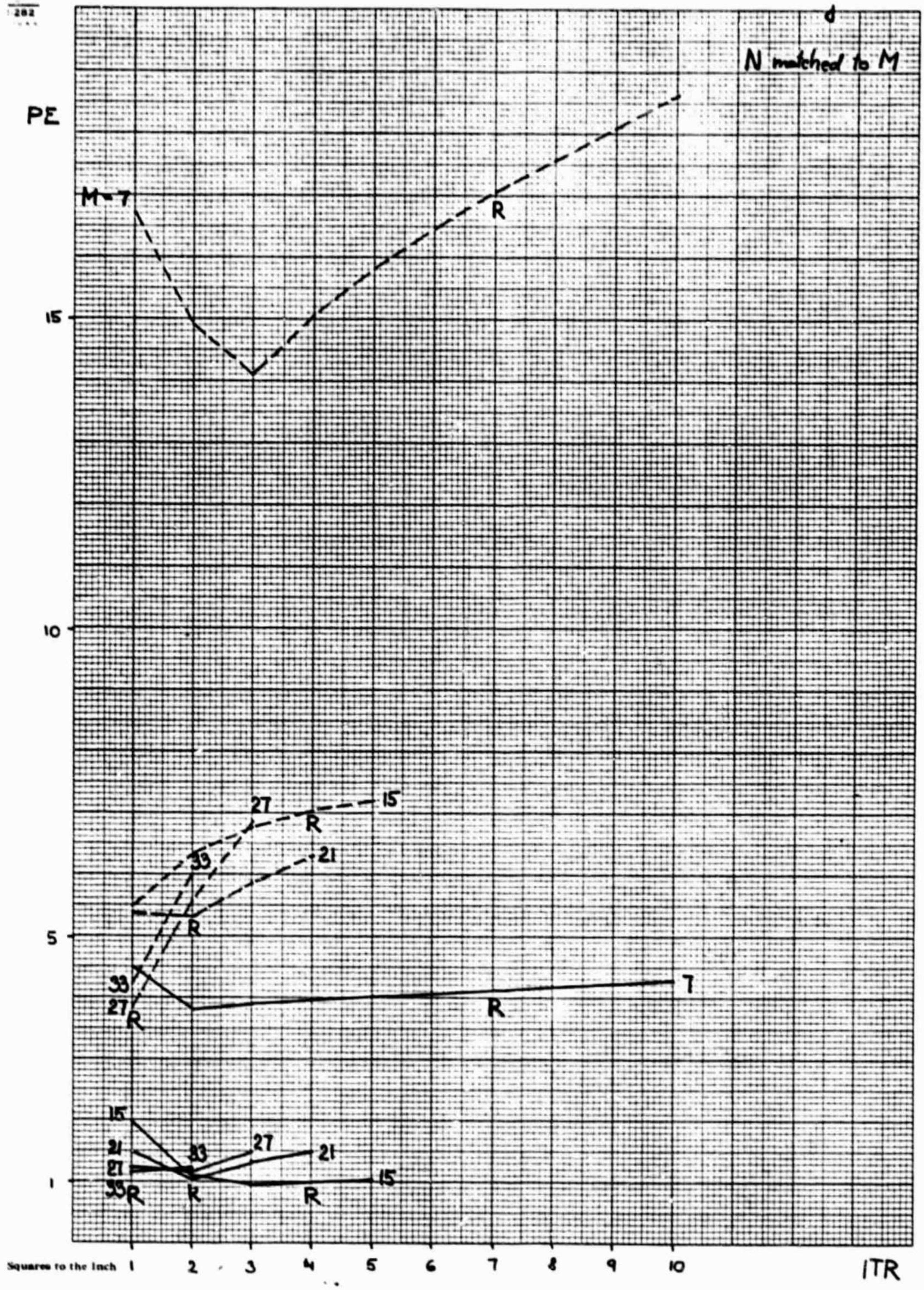


Figure 5d

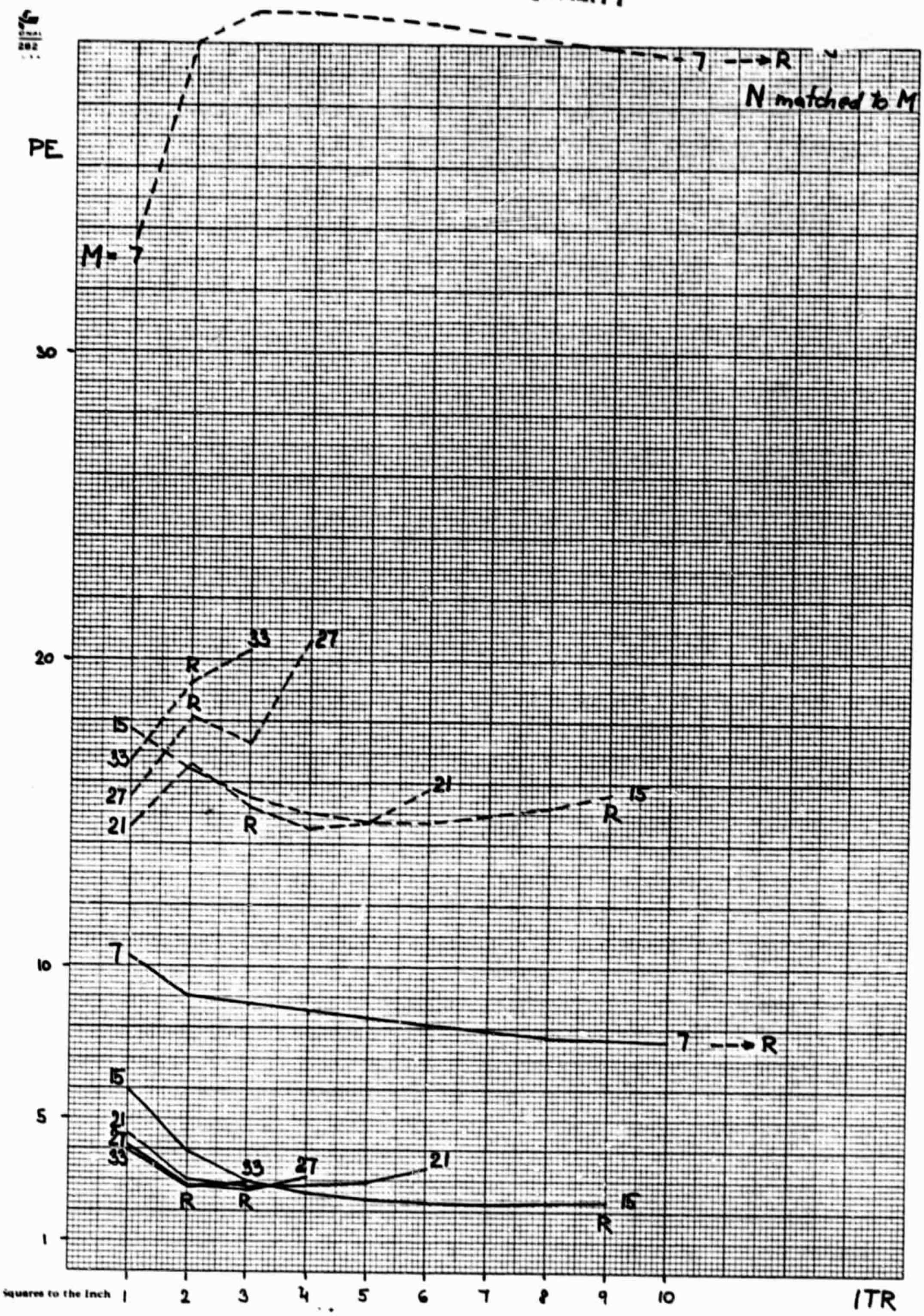

PE
30
20
10
5
1
M= 7
7 → R
N matched to M
33
27
R
R
15
33
27
21
R
21
15
R
7
7 → R
15
21
27
33
33
27
21
R
R
15
R
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5e

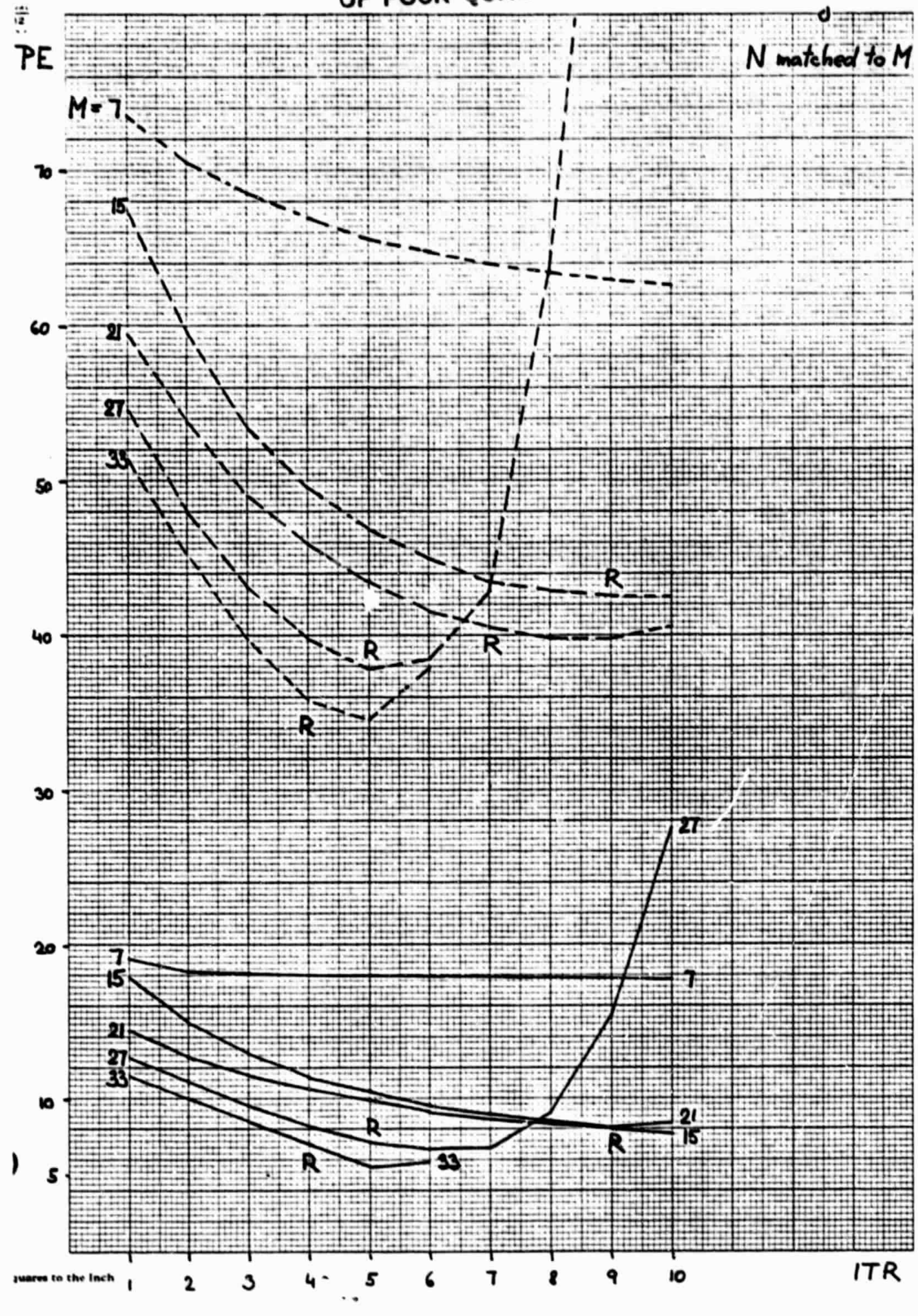

PE
N matched to M
M = 7
15
21
27
33
R
R
R
R
R
R
27
7
15
21
27
33
21
15
33
70
60
50
40
30
20
10
5
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5f

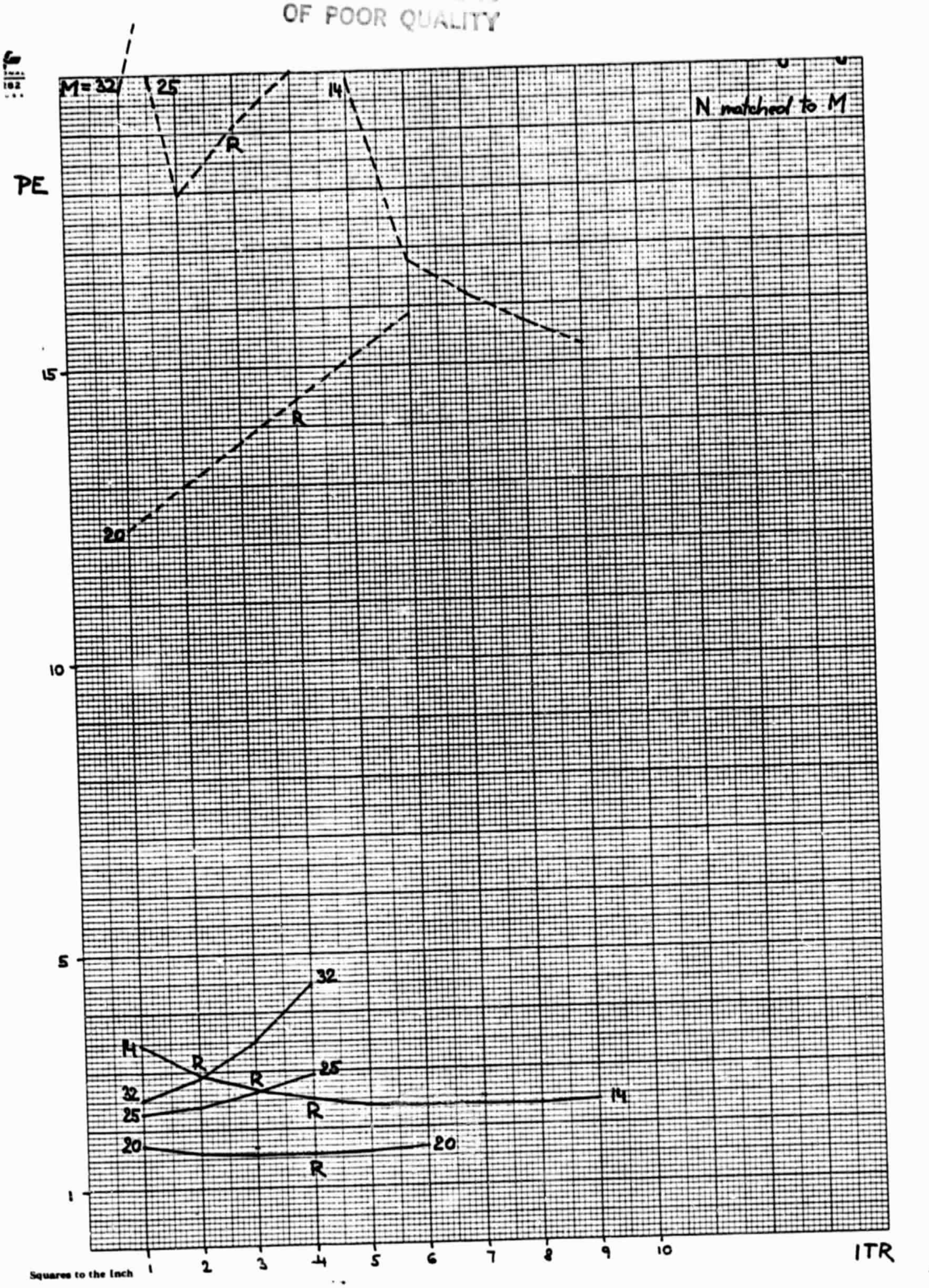

M=32
25
14
N matched to M
PE
R
R
15
20
10
5
32
14
R
32
R
25
25
R
14
20
20
R
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5g

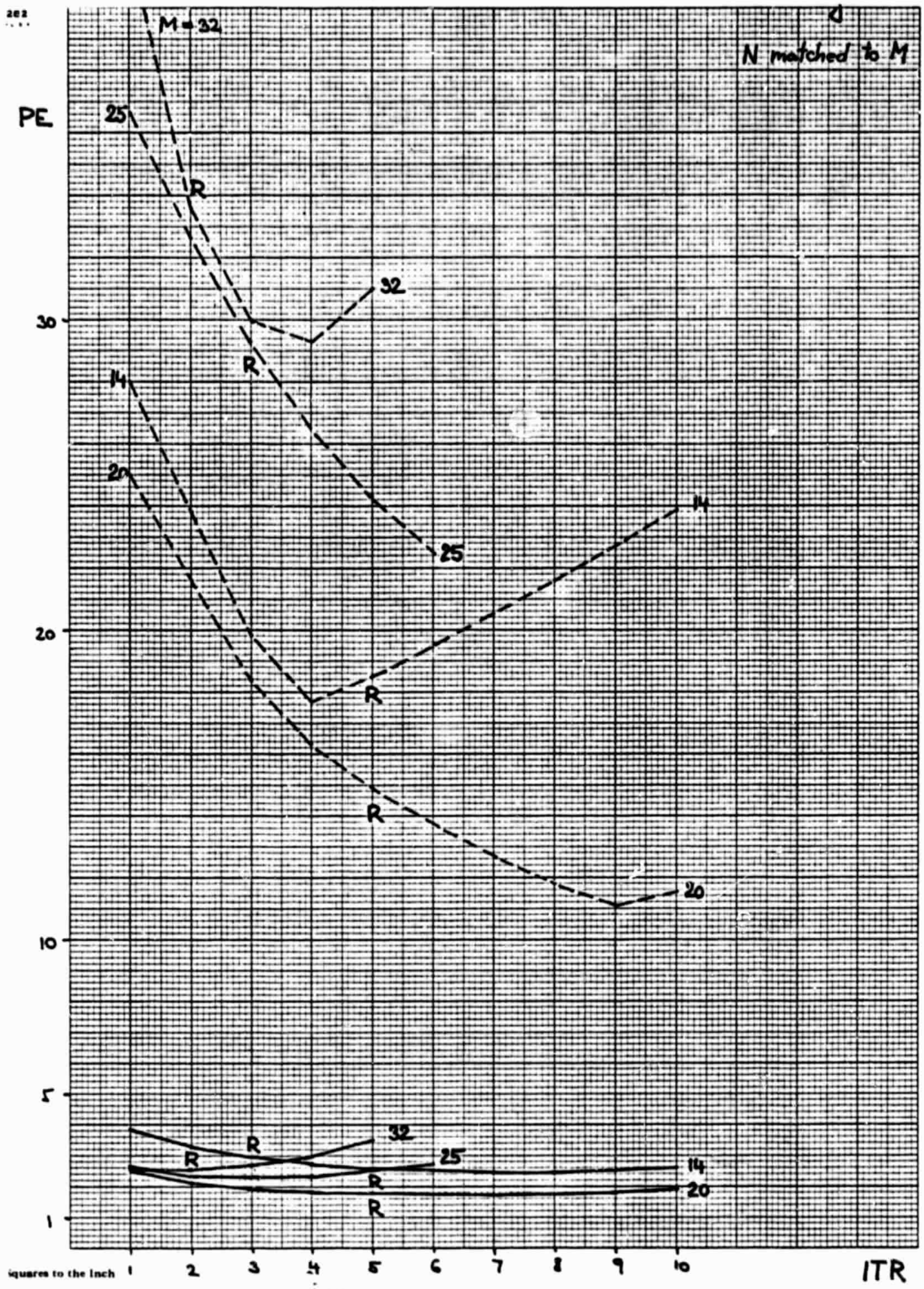

M = 32
N matched to M
PE
30
20
10
5
1
25
14
20
32
R
squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5h

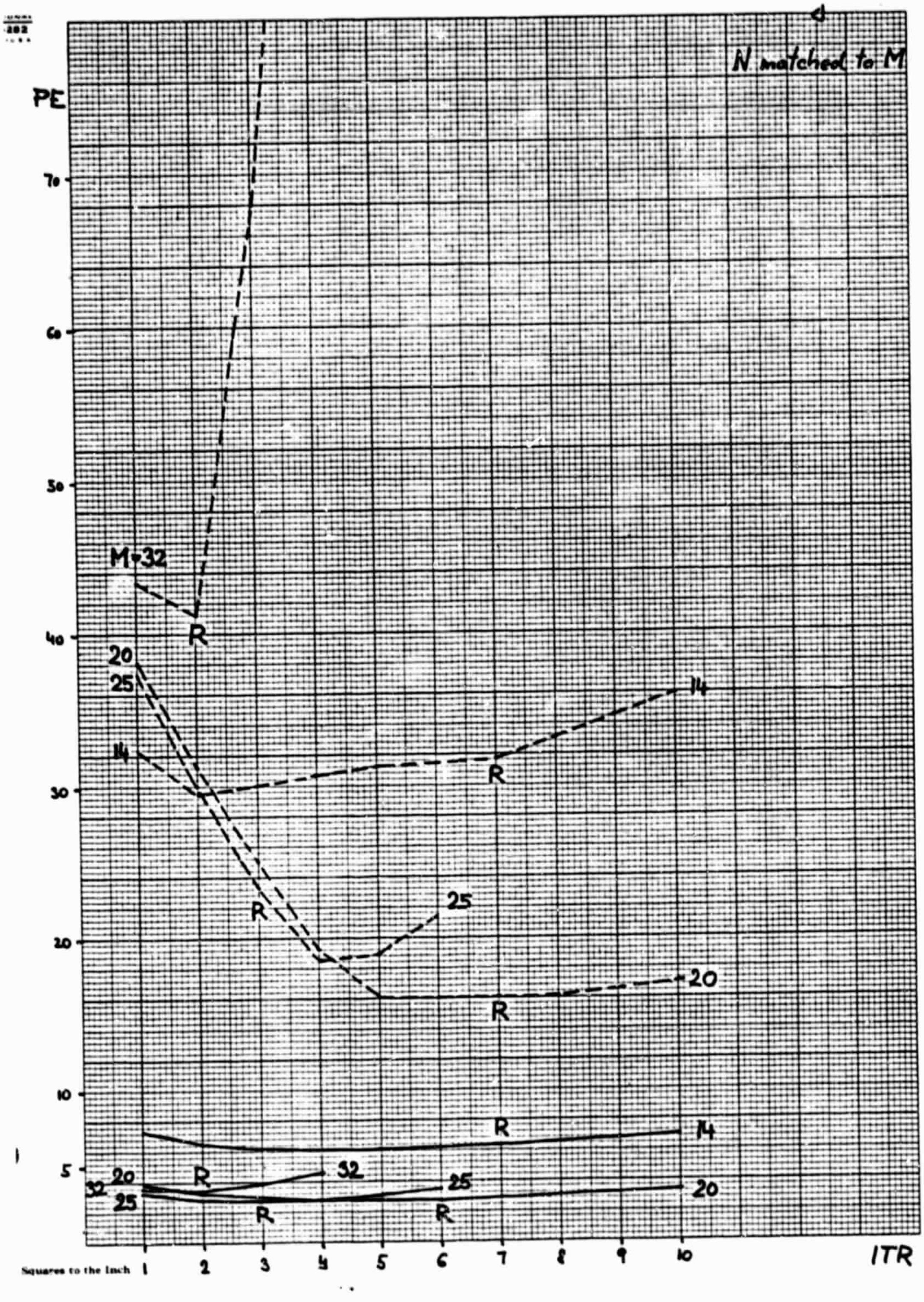
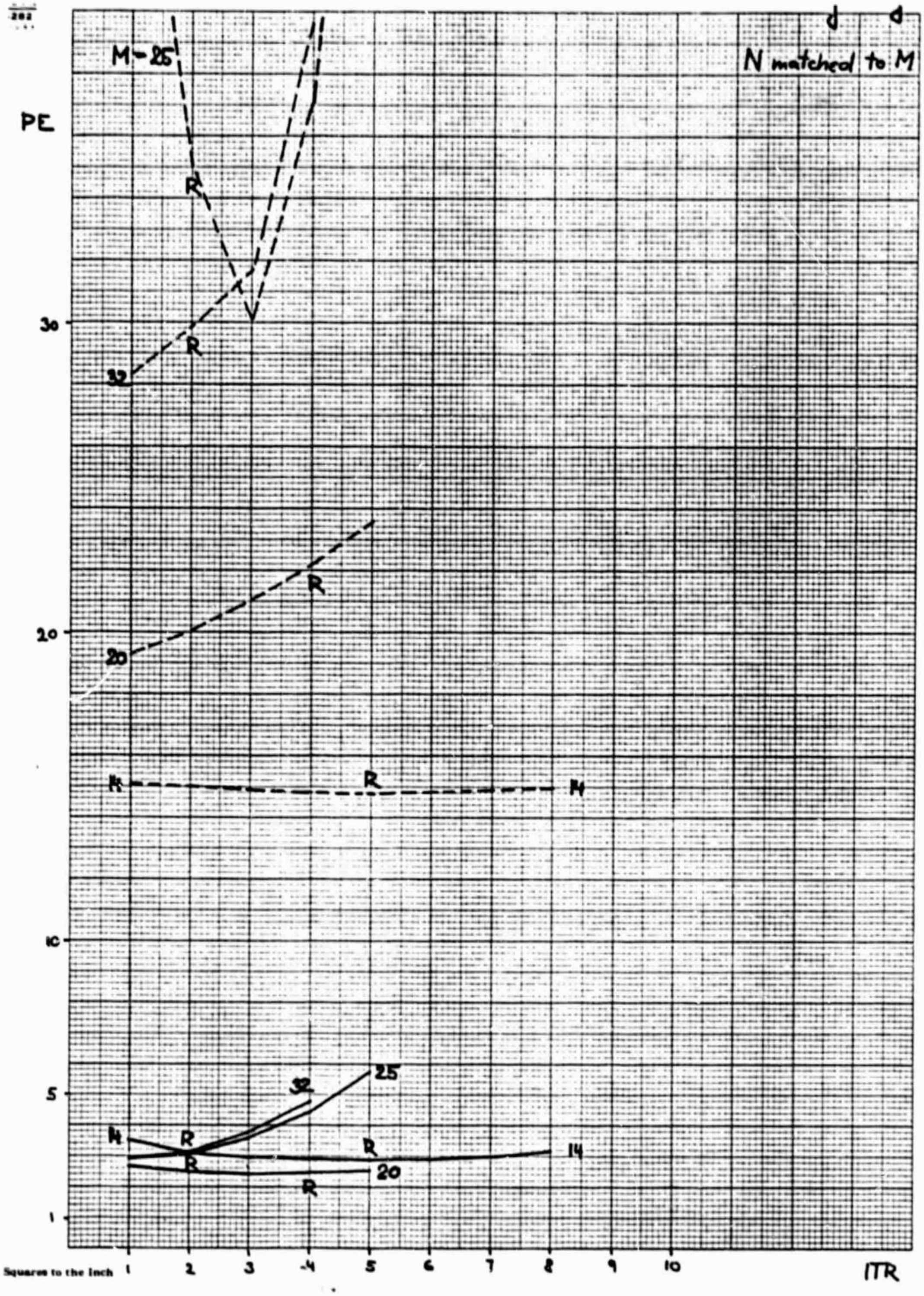

N matched to M
PE
70
60
50
40
30
20
10
5
M=32
R
20
25
14
R
R
25
20
R
R
14
20
R
32
32
25
25
R
R
20
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5i



M-25
N matched to M
PE
30
32
R
20
R
14
R
14
10
5
1
32
25
14
R
R
R
20
R
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5j

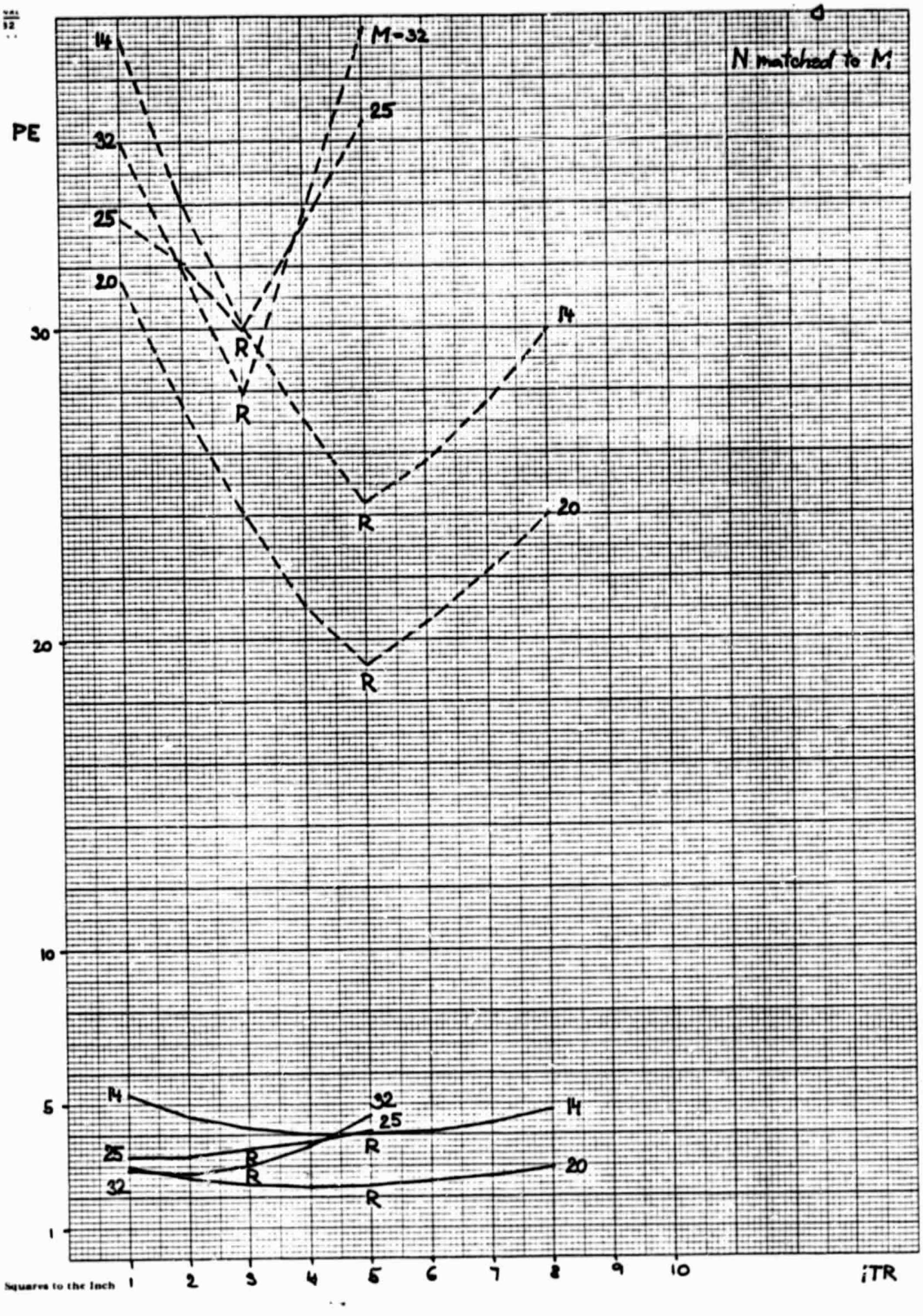

N matched to M
PE
M-32
14
32
25
20
R
30
20
10
5
1
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
iTR

Figure 5k

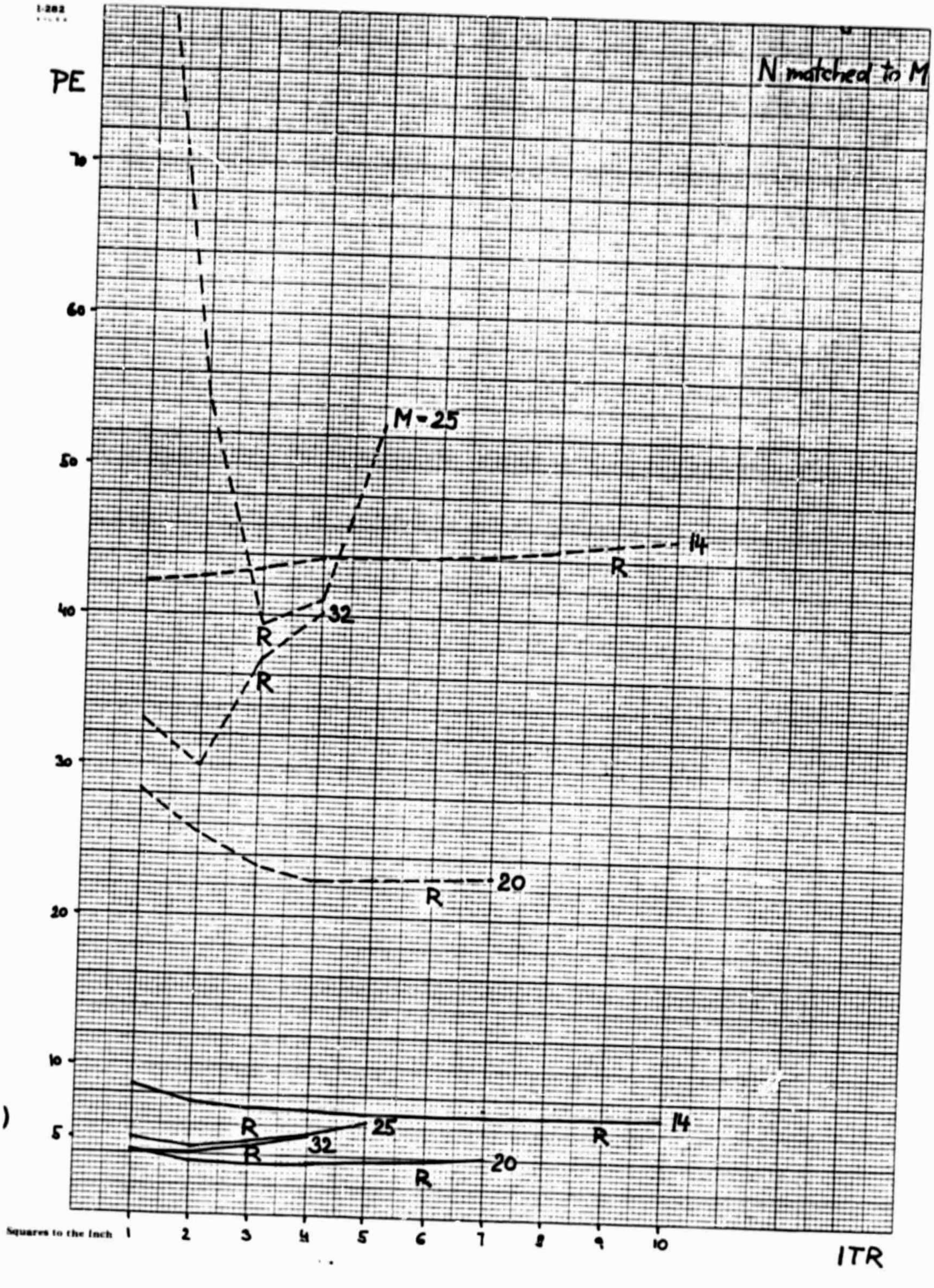

N matched to M
PE
70
60
50
40
30
20
10
5
M-25
14
32
20
R
25
Squares to the Inch
1
2
3
4
5
6
7
8
9
10
ITR

Figure 5ℓ

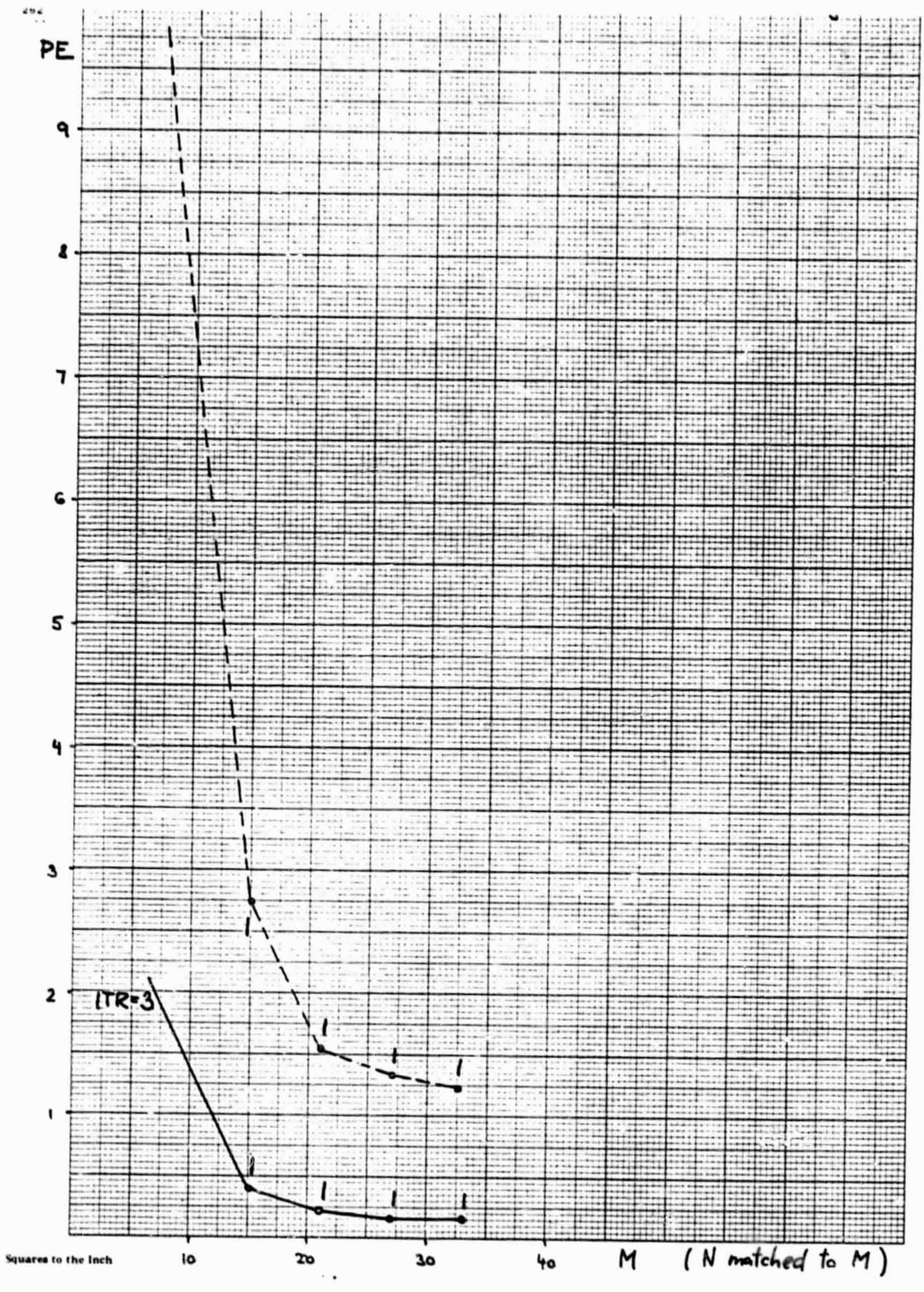

PE
9
8
7
6
5
4
3
2
1
ITR=3
Squares to the Inch
10
20
30
40
M
(N matched to M)

Figure 6a

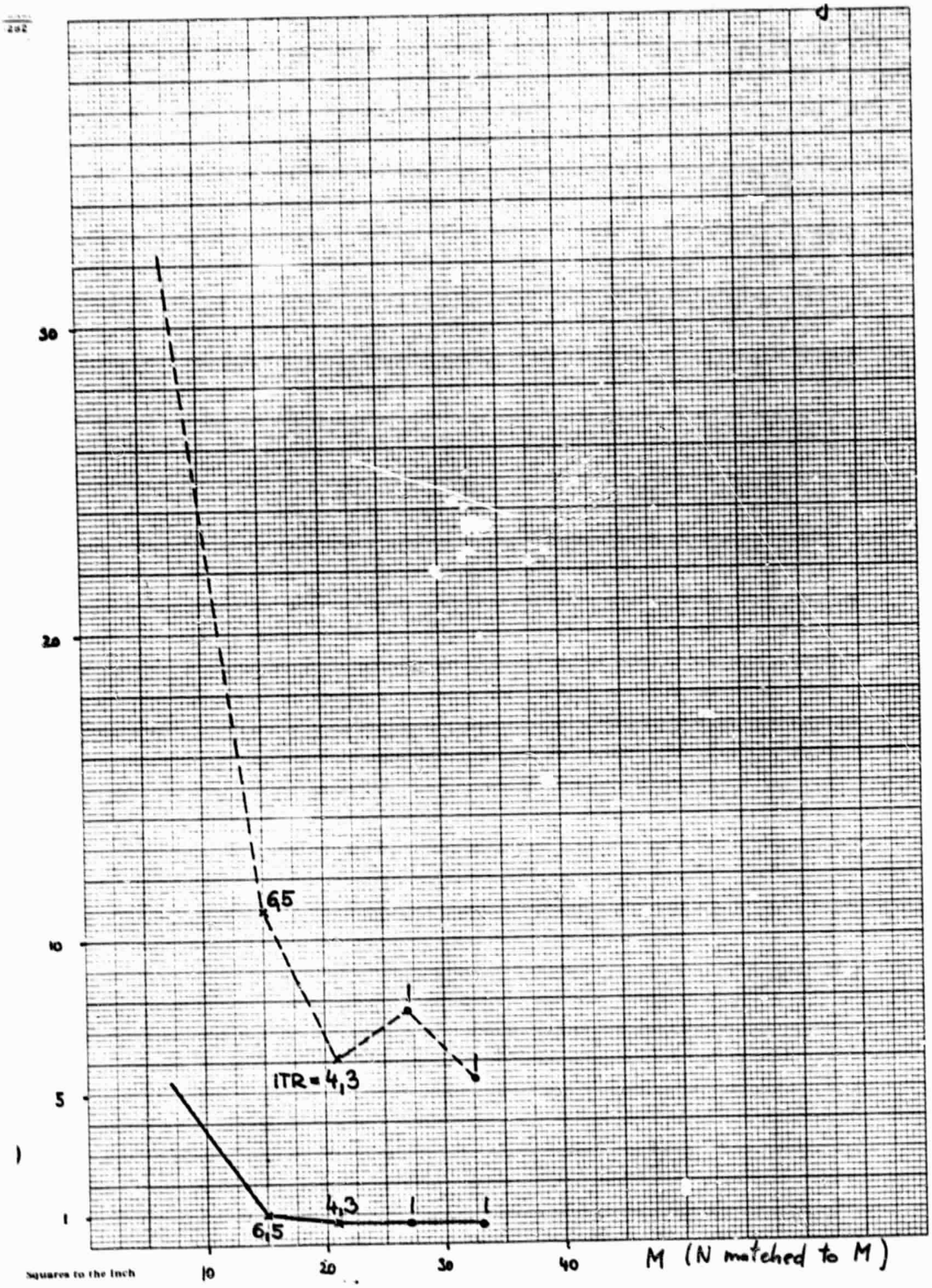

30
20
10
5
1
6,5
ITR = 4,3
1
1
4,3
6,5
1
1
Squares to the Inch
10
20
30
40
M (N matched to M)

Figure 6b

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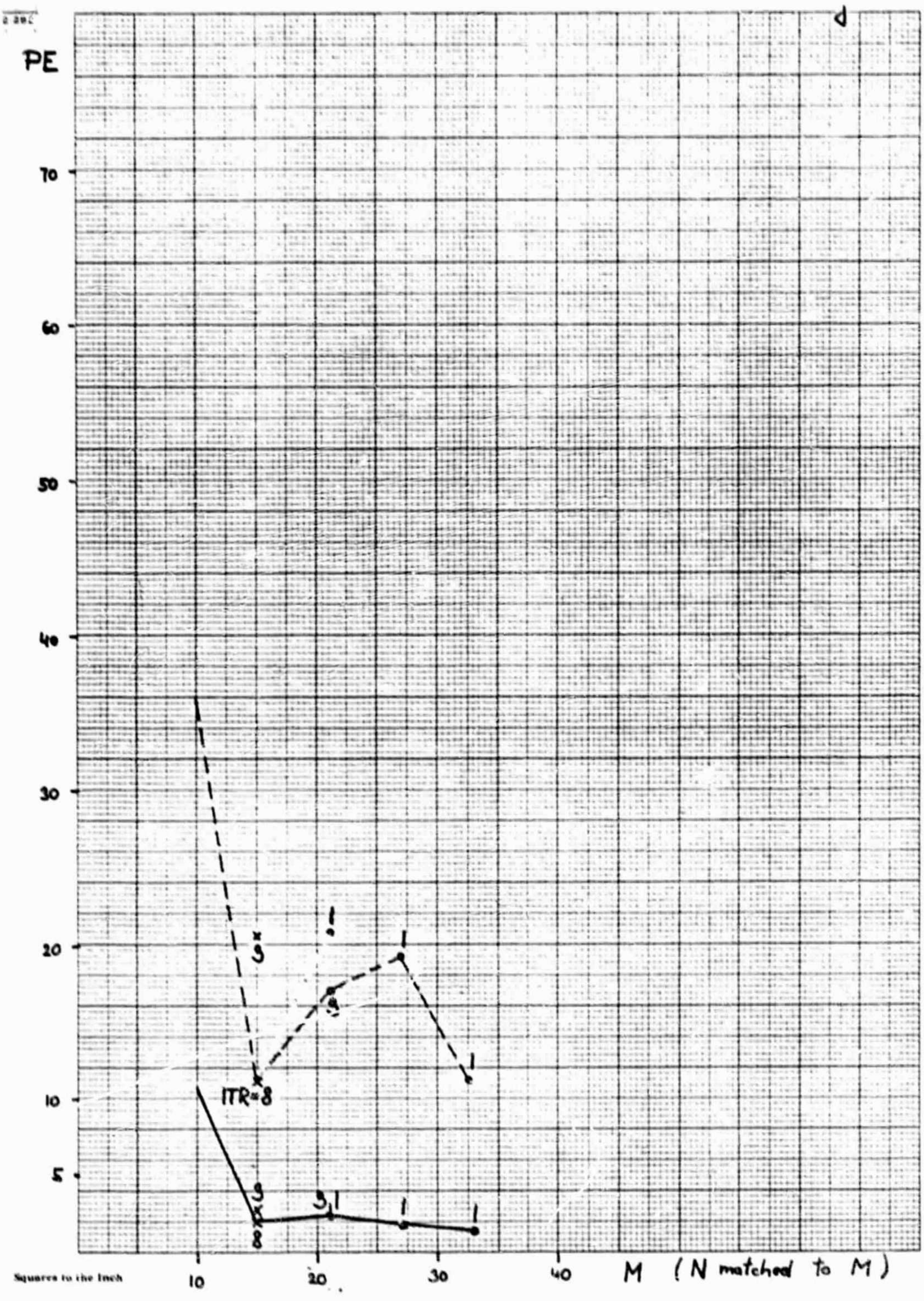

Figure 6c

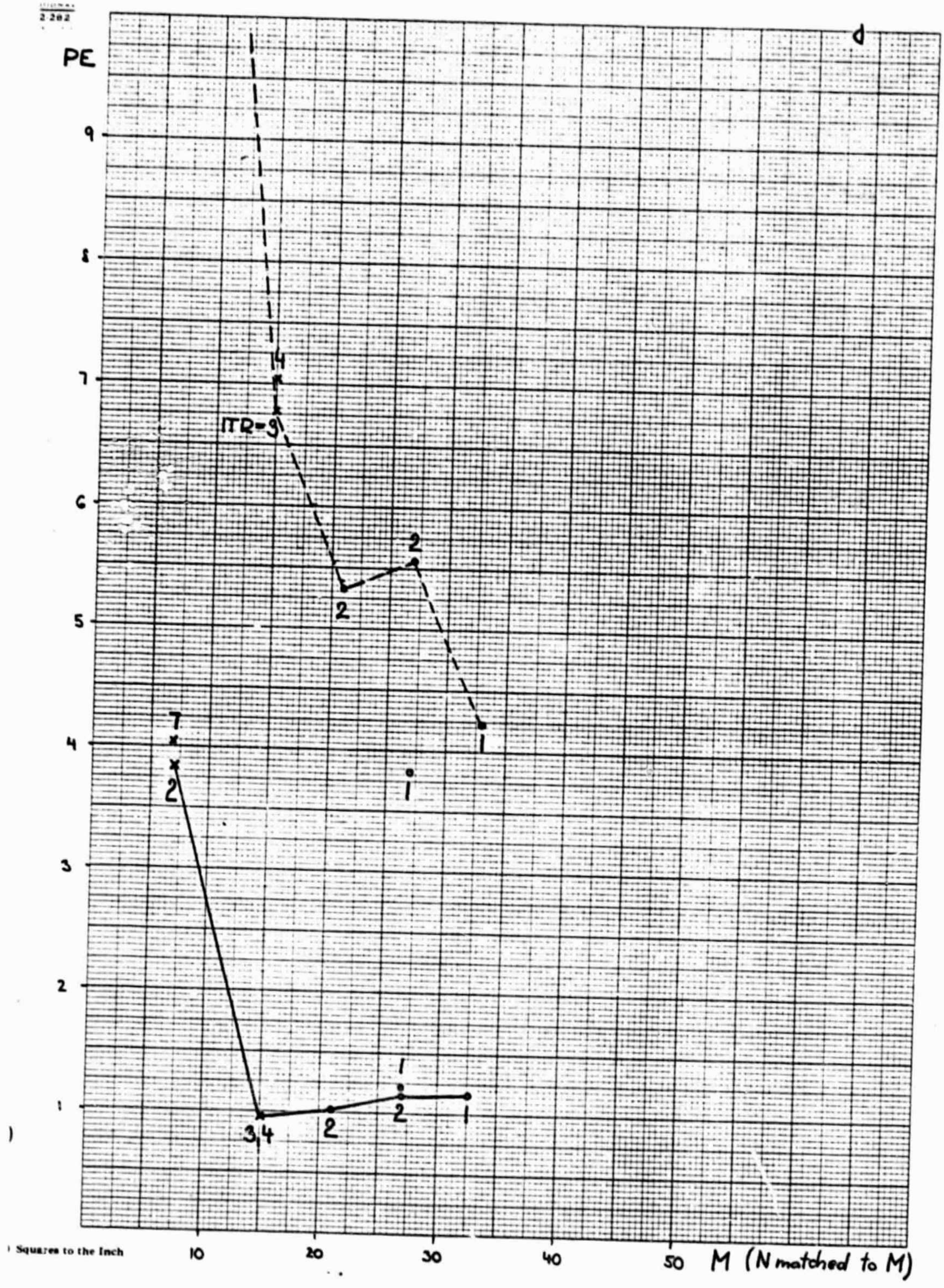
PE
9
8
7
6
5
4
3
2
1
ITR=3
Squares to the Inch
10
20
30
40
50
M (N matched to M)

Figure 6d

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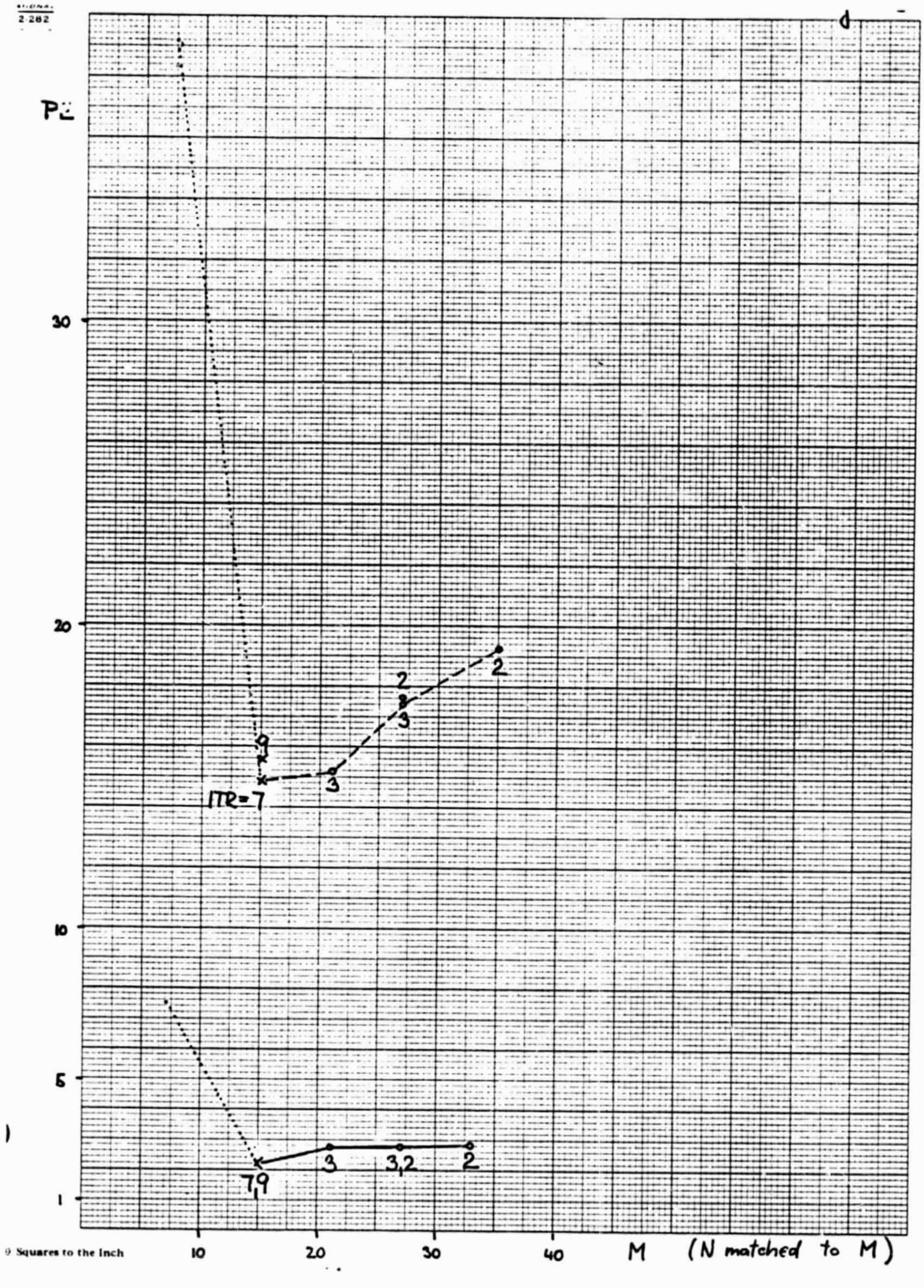

Figure 6e

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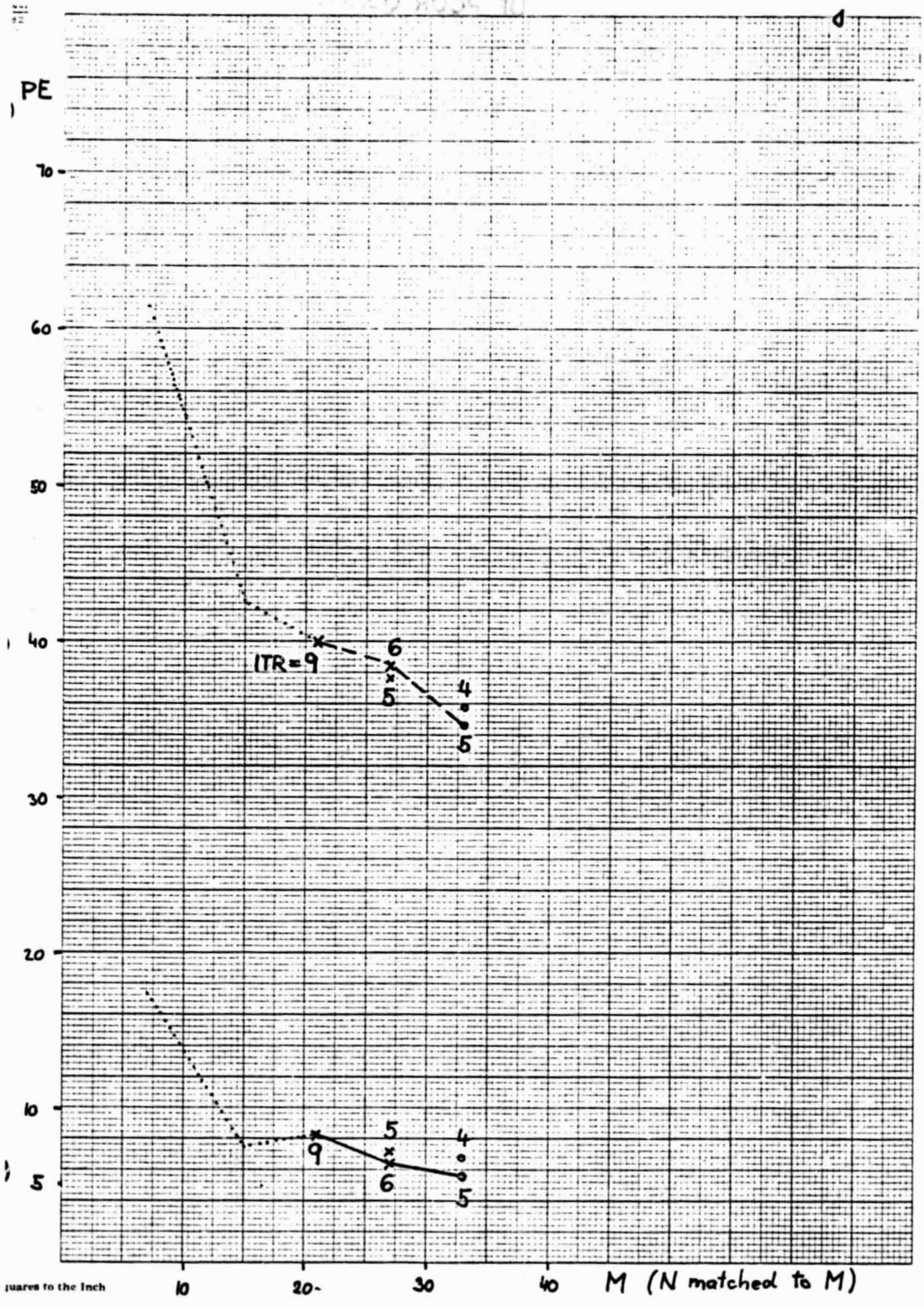

Figure 6f

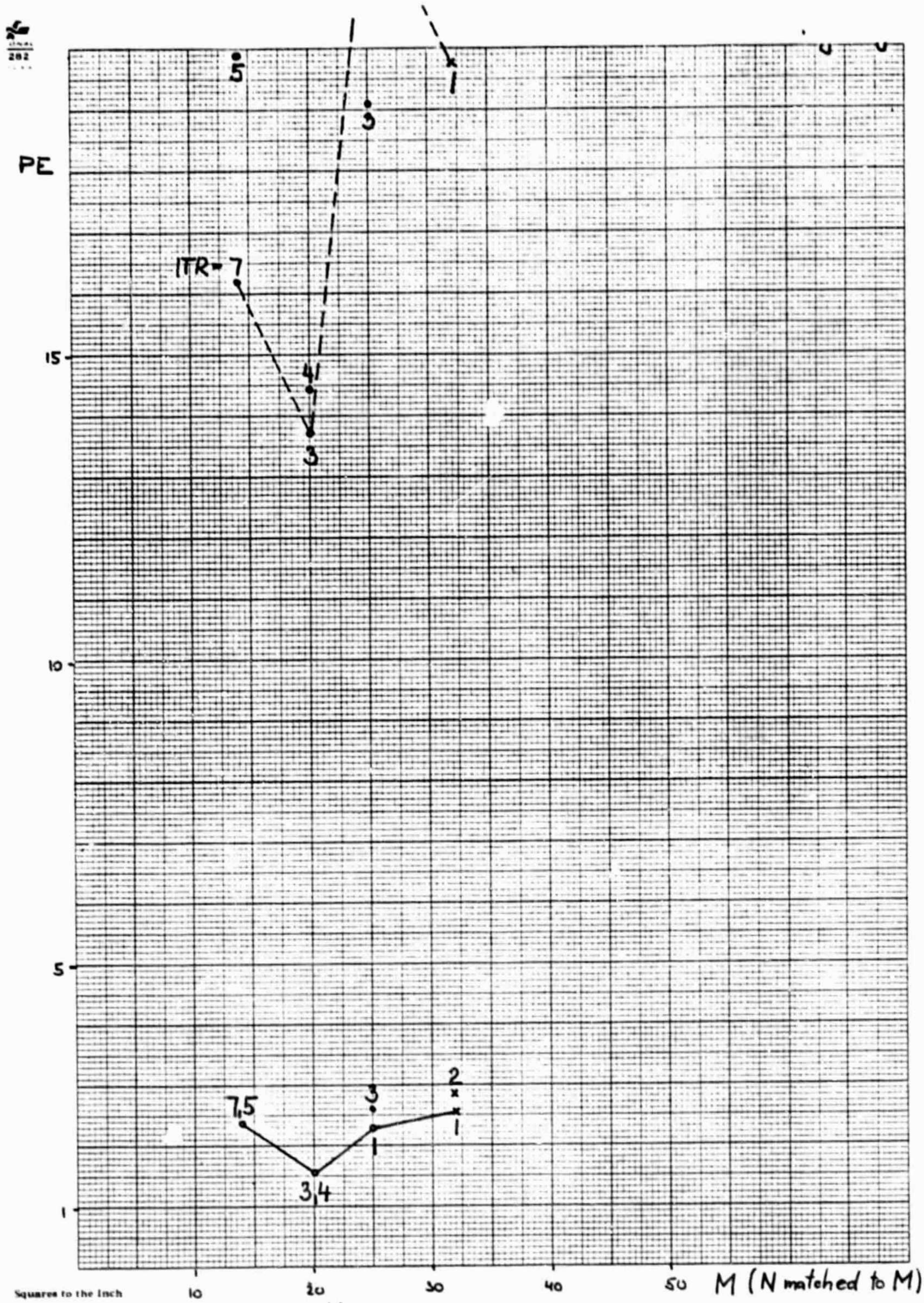
PE
ITR = 7
5
3
1
4
3
15
10
5
1
7,5
3,4
3
1
2
1
Squares to the Inch
10
20
30
40
50
M (N matched to M)

Figure 6g

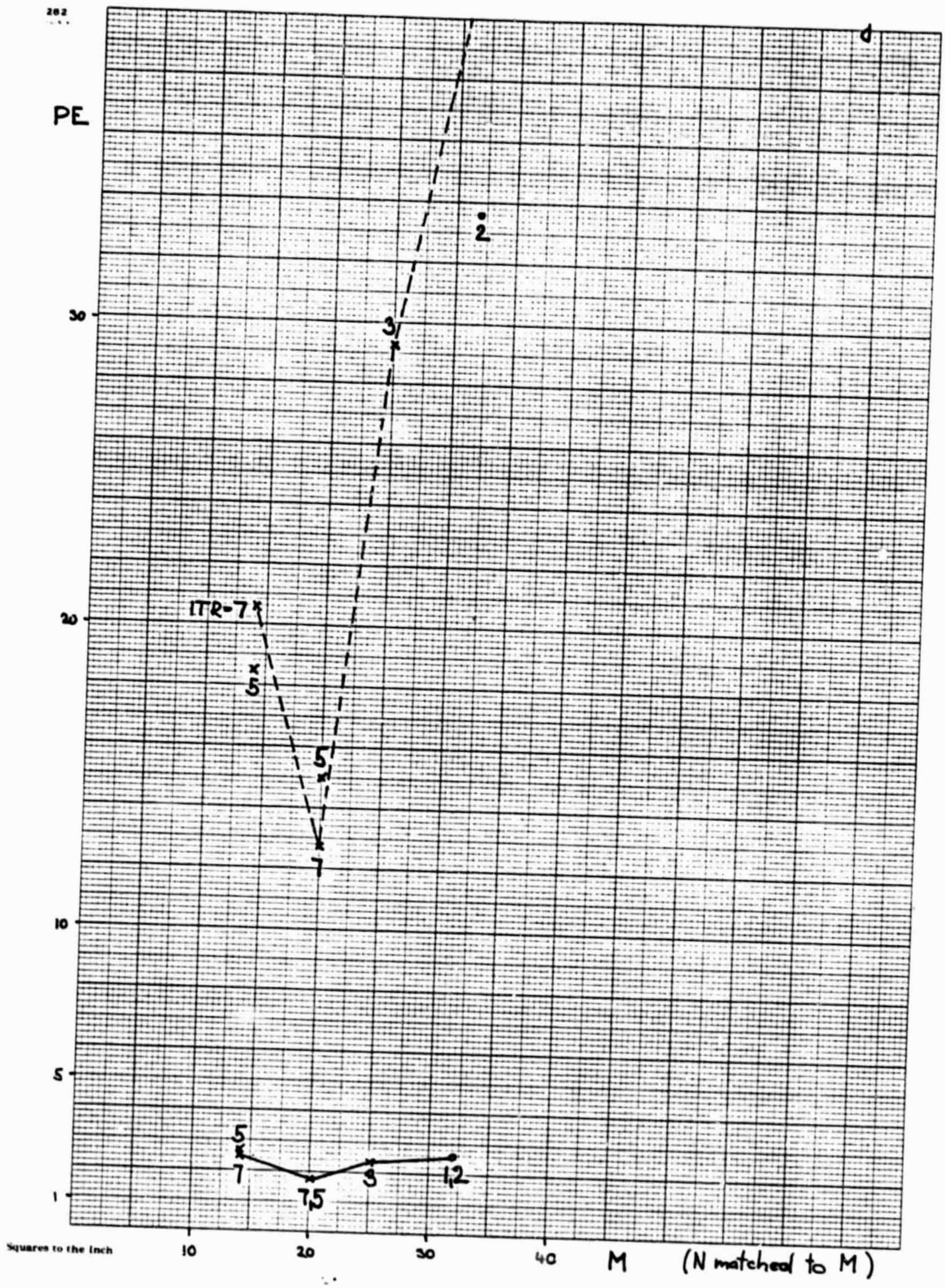
PE
30
20
10
5
1
ITR-7
5
5
7
3
2
5
7
7,5
3
1,2
Squares to the Inch
10
20
30
40
M
(N matched to M)

Figure 6h

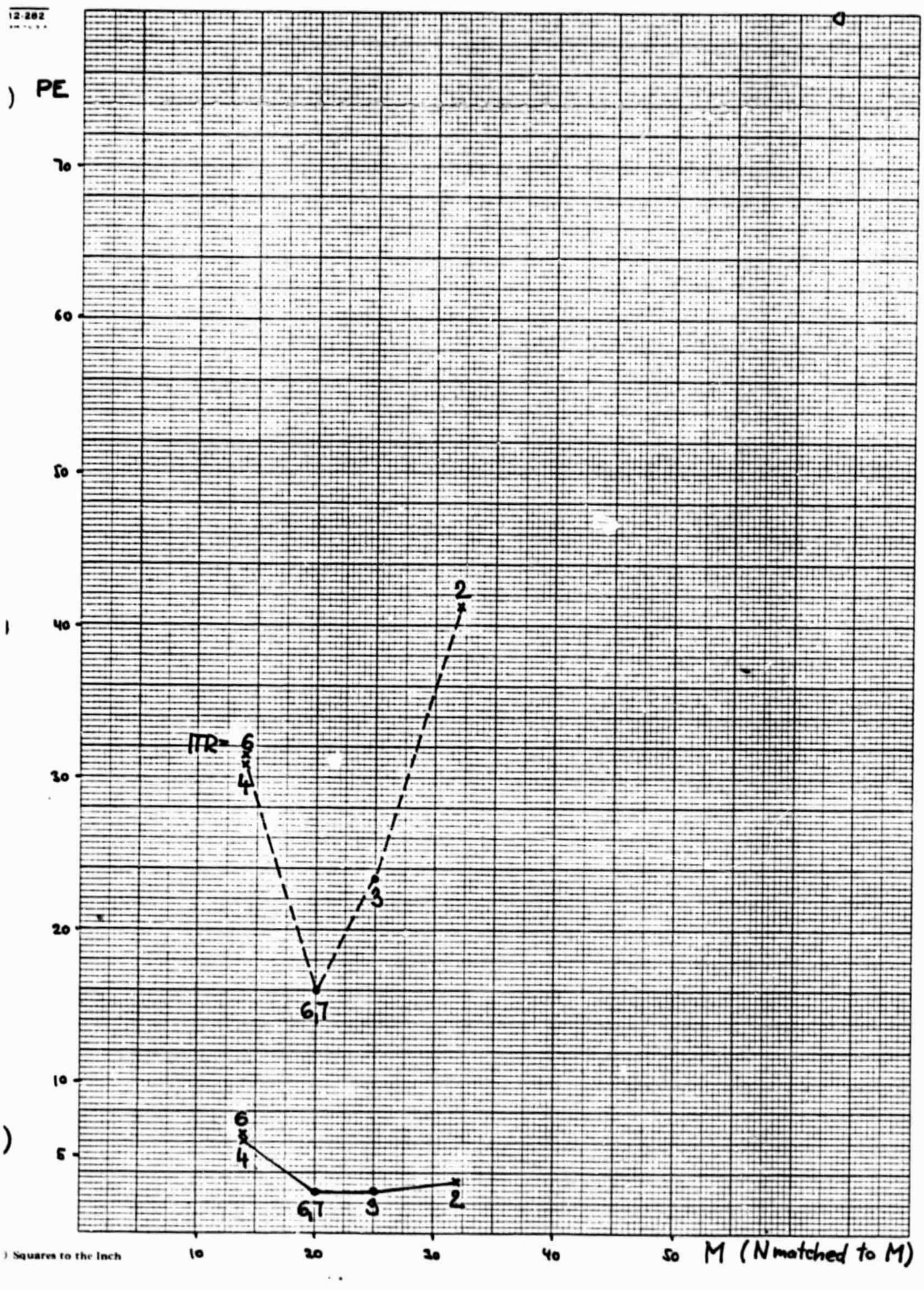
PE
70
60
50
40
30
20
10
5
ITR= 6
4
2
3
6,7
6
4
6,7
3
2
10
20
30
40
50
M (N matched to M)
Squares to the Inch

Figure 6i

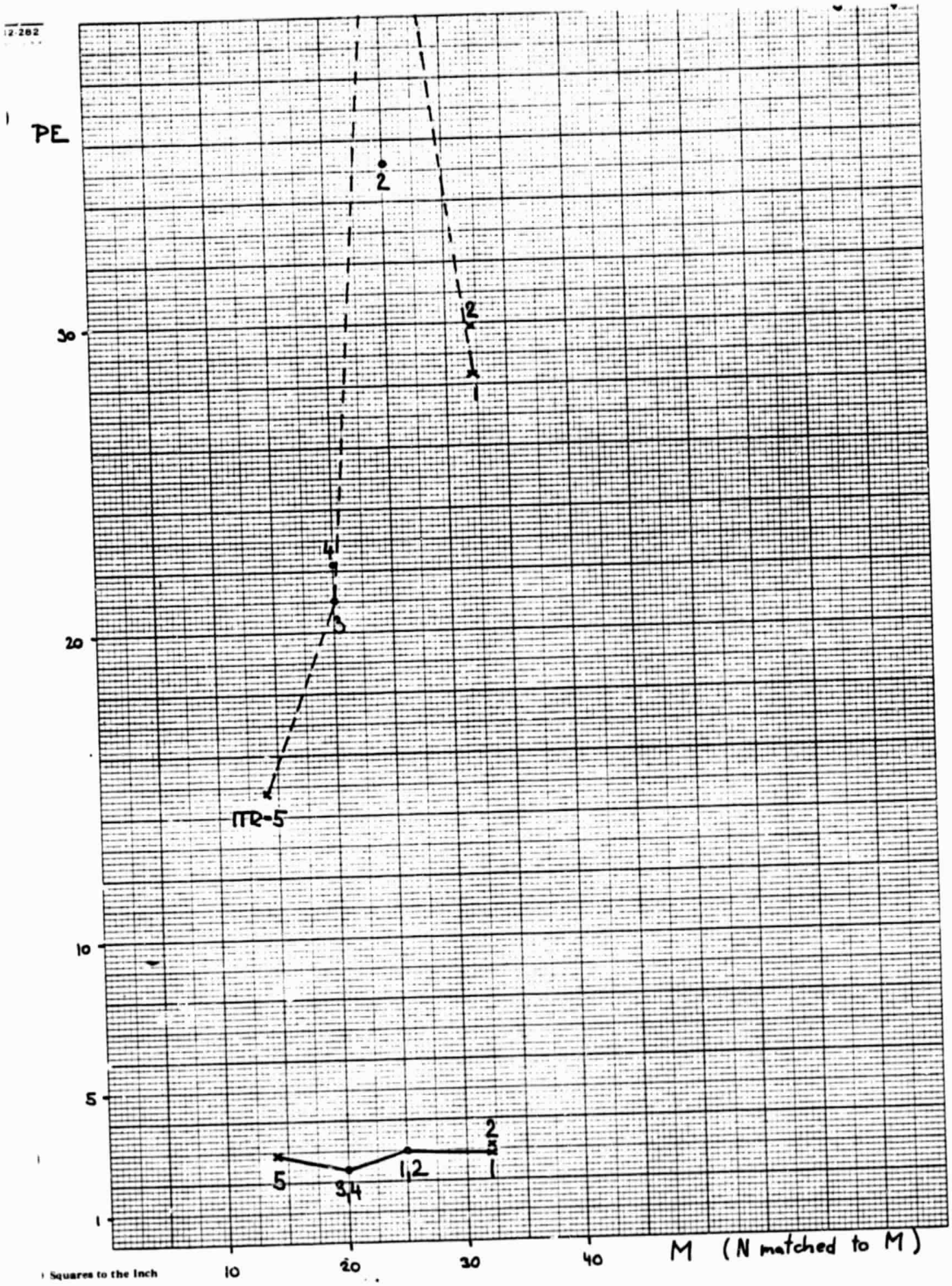
PE
30
20
10
5
1
10
20
30
40
M (N matched to M)
ITR-5
2
2
4
3
5
3,4
1,2
2
1
Squares to the Inch

Figure 6j

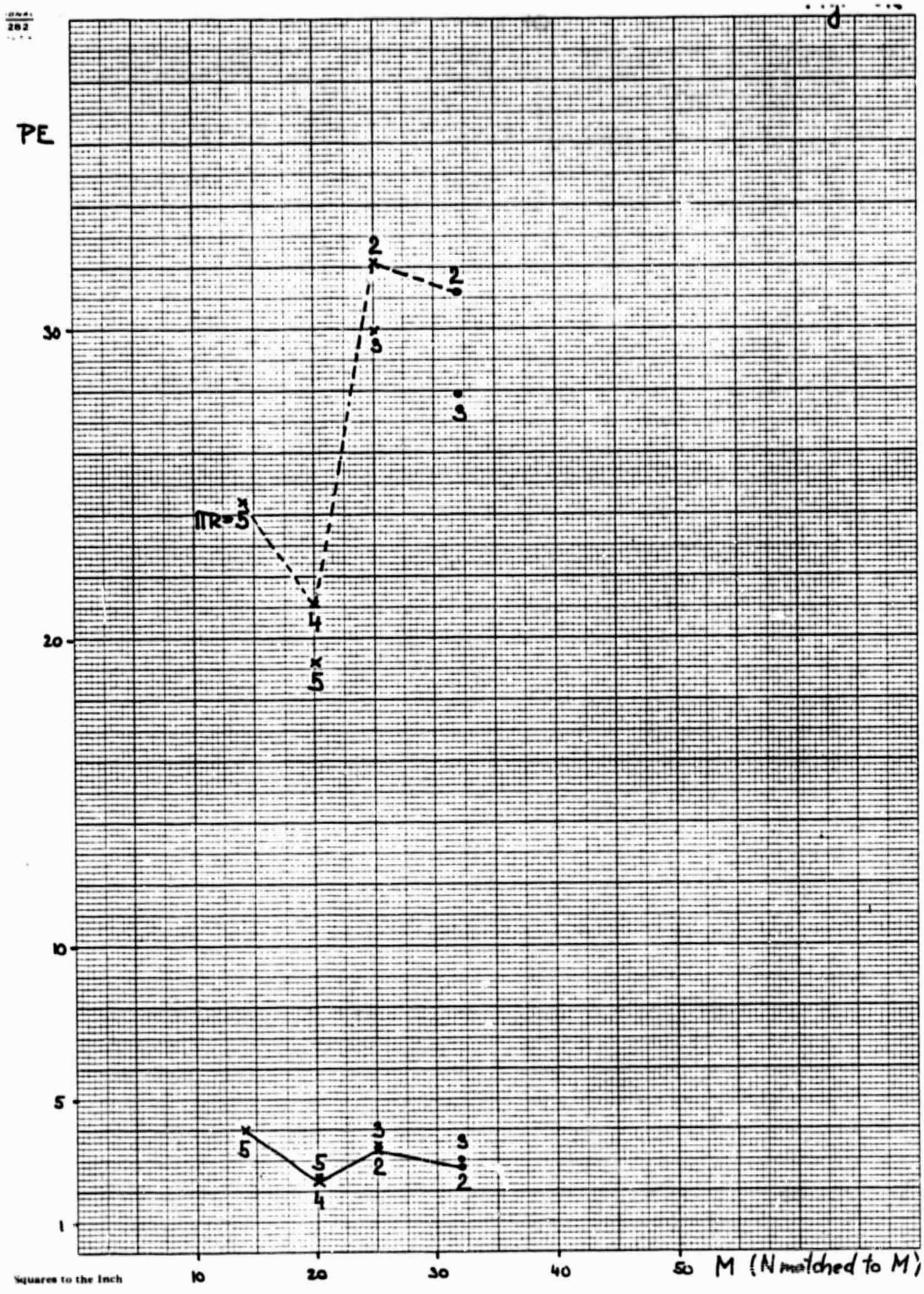
PE
30
20
10
5
1
Squares to the Inch
10
20
30
40
50
M (N matched to M)
ITR=5

Figure 6k

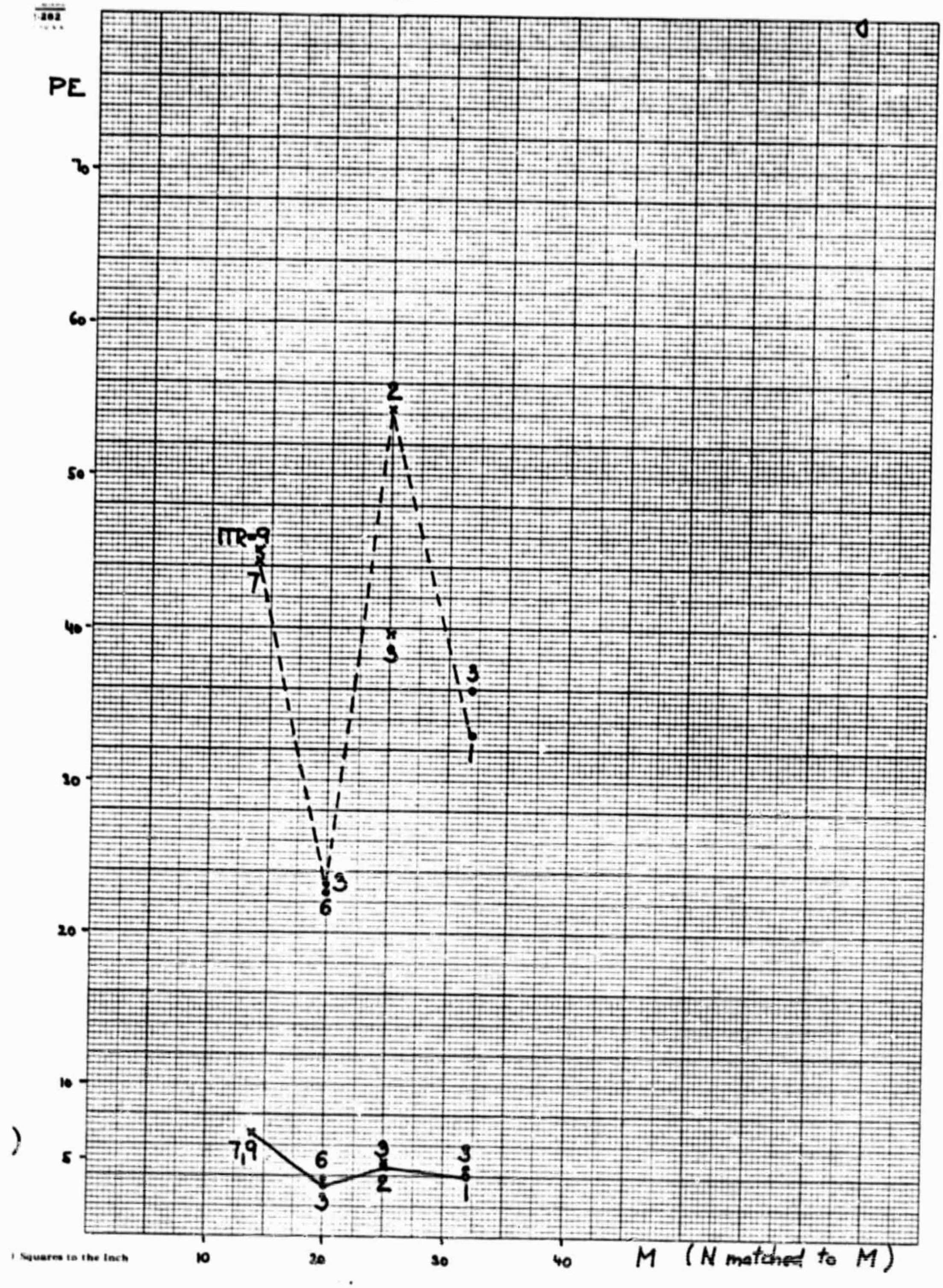
PE
70
60
50
40
30
20
10
5
ITR-9
10
20
30
40
M (N matched to M)
Squares to the Inch

Figure 6ℓ

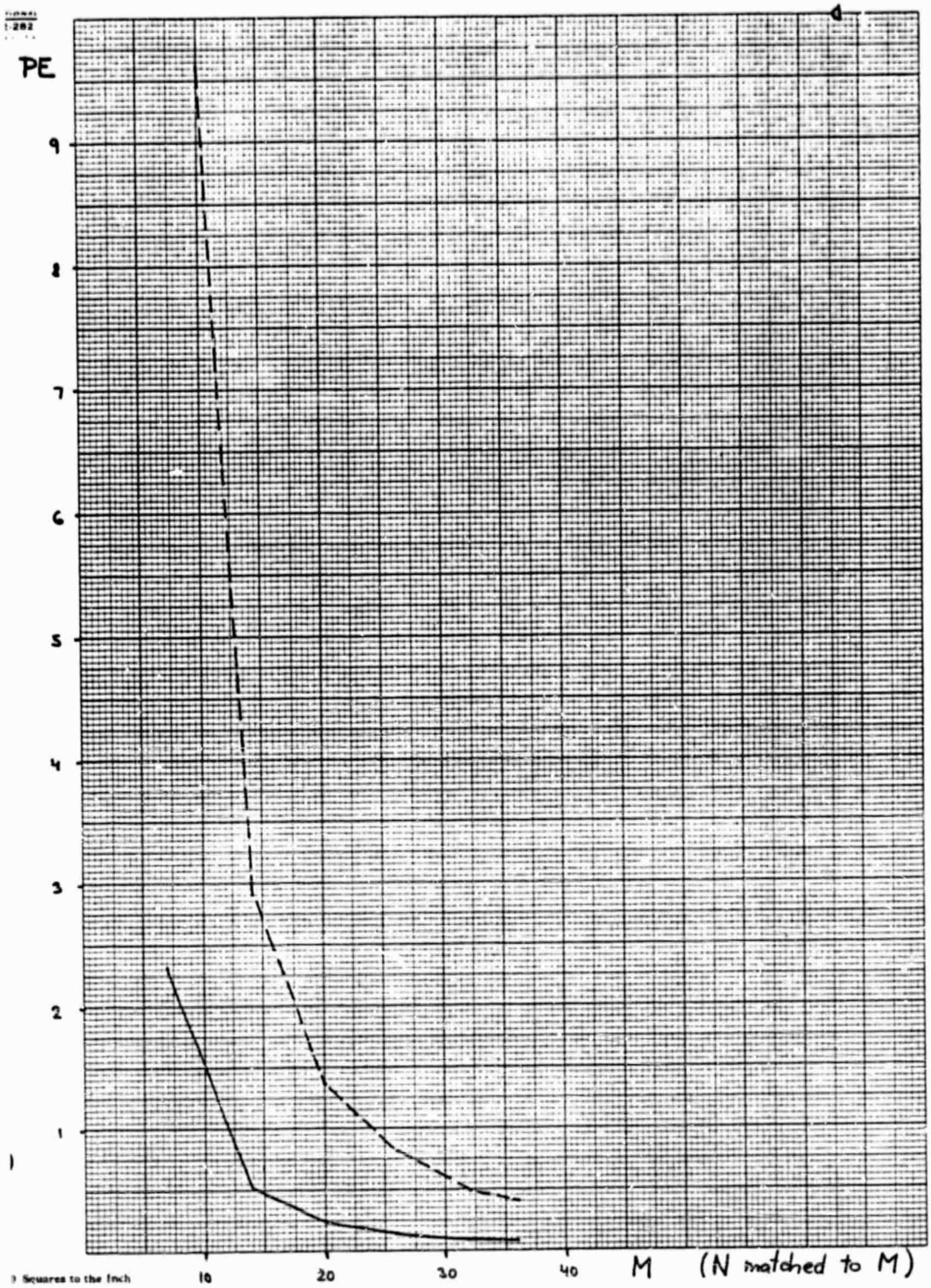

Figure 6m

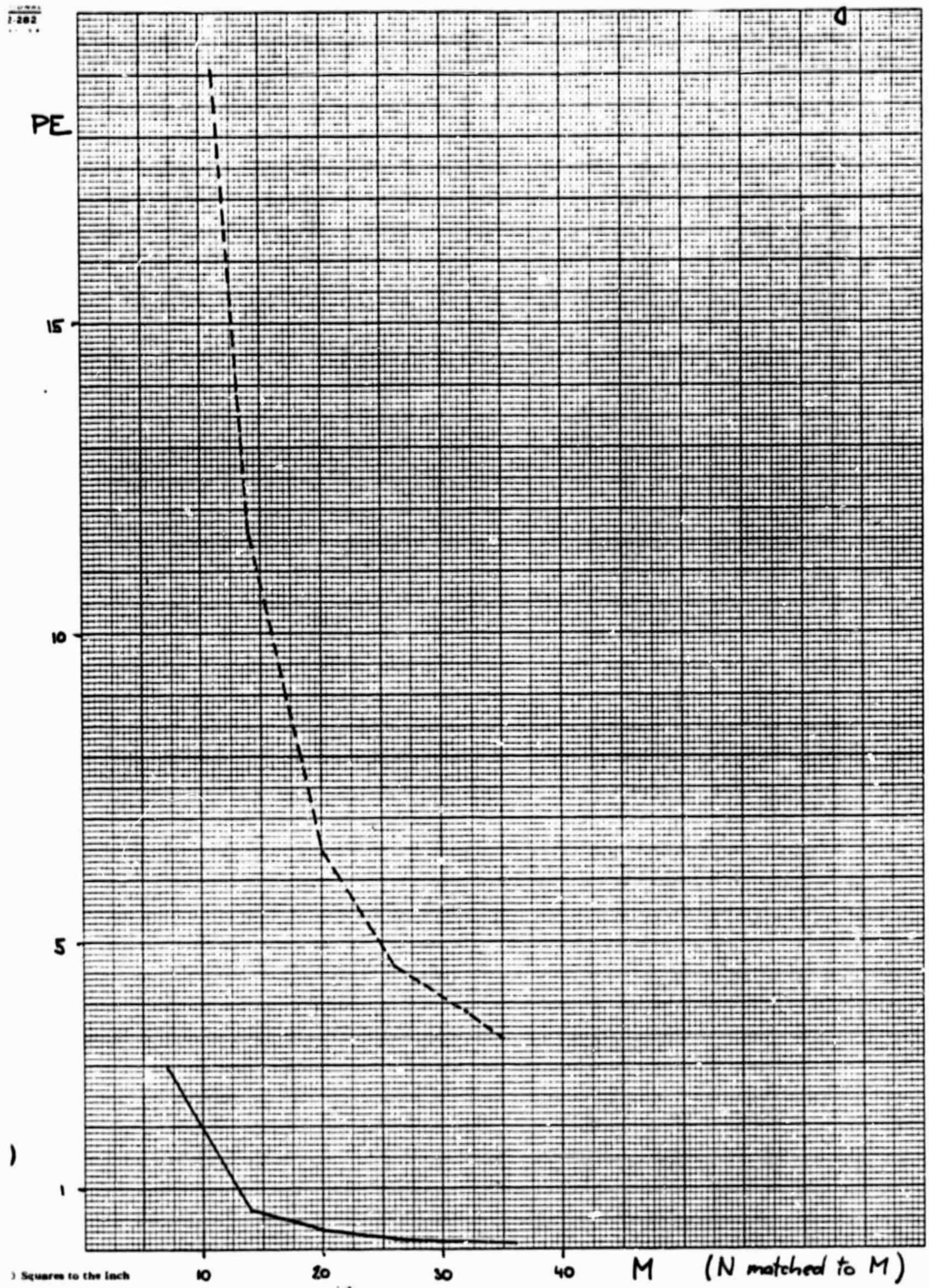

Figure 6n

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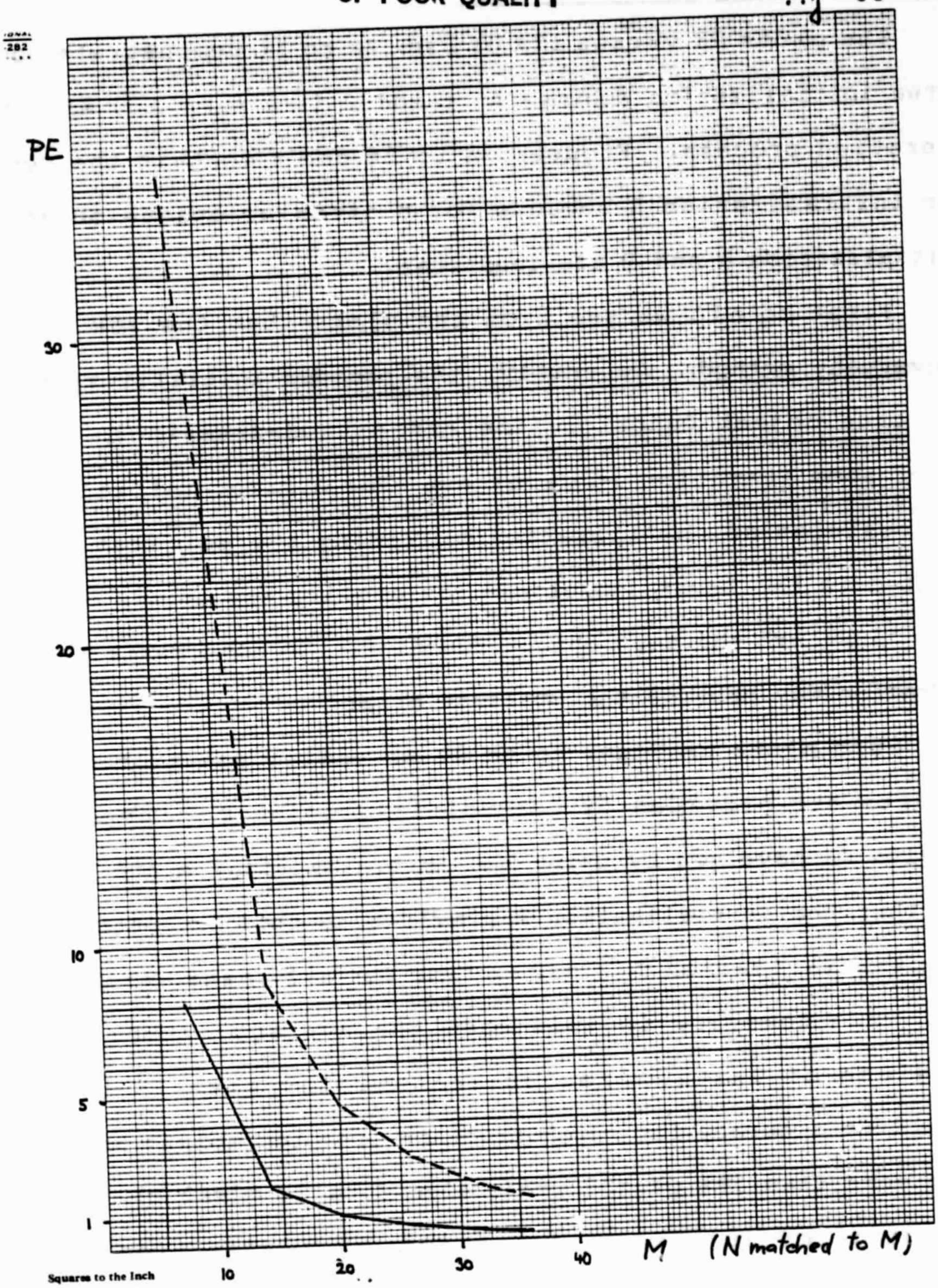

Figure 6o

C-2

4.2.1 Different Initializations

The plots PE versus ITR of Fig. 2a to 2ℓ demonstrate how the three initialization schemes A, B and C (see par. 3.3) affect the iteration process. Figures 2a to 2f don't contain the results for initialization B because for a circular opaque object the initialization A and B are identical.

First of all we see from the plots that the ICM is not a convergent method. Generally, the process initially approaches the true object function (the error is decreasing); however, after some iteration it diverges. For a fixed initialization, the position of the iteration providing the smallest error is shifted to the lower iterations the smaller the opaque object and the "simpler" the test object function. In some cases the first iteration may provide the smallest error.

From plots of Figs. 2g to 2ℓ we easily see that the worst results are provided by the initialization B. Comparing the results we have got by using the initializations A and C we find out that the initialization A provides as good or better results than initialization C. This is true for all cases except that of Fig. 2d. However, in this case the average errors for both versions of initialization are smaller than 1% (which is excellent accuracy for reconstruction from incomplete projections when more than 50% of the projection data is missing). The main advantage of initialization A over initialization B is its substantially higher efficiency. When initialization A is applied, a substantially smaller number of iterations is needed to obtain the minimum of the PE versus ITR plot.

In conclusion, initialization A has been selected as the best one. All other computations have been made using it.

4.2.2 Dependence on the Number of Projections

The plots of PE versus ITR in Figs. 3a to 3ℓ and the plots of PE versus N in Figs. 4a to 4ℓ show how the results are affected by the number of projections N. Evaluation of these plots can be summarized as follows:

For a fixed number of data M in each projection it is suitable to select N in the interval between N = M and N given by Eq. (23). The value of N matched to given M by Eq. (23) is indicated on the coordinate axis N by the mark "m" in each Fig. 4. A smaller number of projections substantially decreases the accuracy of the computation and a higher value doesn't improve the results. If only one value of N is to be recommended, it would be the value of N given by the condition (23).

4.2.3 Dependence on the Number of Rays in each Projection

Having roughly defined the optimum ratio between N and M, we studied the dependence of the iterative convolution process on the number of data M using the corresponding N specified by Eq. (23). This means in fact that we studied how the iteration process depends on the quantity of complete input data having matched the number of projections N with the number of rays in each projection M, rather than how it depends on the number of rays M alone. Results of this study are presented in plots of PE versus ITR in Figs. 5a to 5ℓ and in plots of PE versus M in Figs. 6a to 6o.

For this series of computations the opaque object C6 was a circular object with the radius $r_c = 0.7$ instead of $r_c = 0.6$. Because these are M uniformly spaced sampling points over the whole projection, the radius r_c was defined by

$$r_c = \frac{M+1-2A}{M-1} \qquad (48)$$

where 2A is the number of sampling points in the unblocked part of the projection. Recall that the edge points at which the projection function drops to zero contribute to M as well as to 2A. The radius $r_c \sim 0.7$ varied less with M than the radius $r_c \sim 0.6$, so $r_c \sim 0.7$ was used in this study. Note that for different values of M the circular opaque obstacles change size only slightly; however, the triangular objects change shape as well as size.

The range of the values of M was selected to be 7 to 33. N was computed from Eq. (23). Again it is obvious from the plots in Figs. 5 that the ICM is not convergent to the true object function. At first it approaches the true object function; however, after reaching some iteration, which sometimes may even be the first one, the error starts to increase monotonicity. With an increasing number of input data, i.e. with increasing M, and simultaneously with increasing N, the minimum of the plot of PE vs. ITR is shifted towards the lower iterations. The value change of this minimum can be better followed in the plots of PE vs. M in Figs. 6a to 6ℓ. Such behavior means that there is no sense to increase the input data over some particular value. For the majority of our test models the best results have been

obtained for M approximately equal to 20. Only for the test object function NO2 with circular obstacles was there non-negligible improvement of results for M greater than 20.

4.2.4. Termination of the Iteration Process

Since the ICM is not convergent, the determination of a suitable criterion for termination of the iteration process is very important. As stated in Sec. 3.6, the RMS error of the reconstructed object function on the edge circle of radius r_o (RMSO) and the RMS error of the computed projection function over the region where measured data are available (RMSP) provide us with information about the behavior of the iteration process. Generally, both these RMS errors, i.e. RMSO and RMSP, have their minima in different iterations. This can be seen in the plots in Figs. 4a to 4ℓ and Figs. 6a to 6ℓ. In these plots small circles denote points at which both RMS errors were minimum at the same iteration and small crosses denote cases in which they were minimum at different iterations.

We considered several possible criteria for termination of the iteration process. Finally we selected a very simple one. In order to state this termination criterion let us define the following notation. In the j-th iteration the j-th object function, $RMSO_j$, the (j+1)-s projection function and $RMSP_{j+1}$ are computed. $RMSP_1 = 0$ because it is the RMS of error of the initialized projection function. Furthermore, let the computed projection be that which is best matched to the measured data in the J-th iteration, i.e. $RMSP_{J+1}$ is minimum. Then for $J \neq 1$ the resulting object function is taken from the J-th iteration if

$RMSP_{J+2} \geq RMSP_J$ and from (J+1) st iteration if $RMSP_{J+2} < RMSP_J$. If J = 1 then the result is taken from the first iteration if $RMSO_2 \geq RMSO_1$ or from the second iteration if $RMSO_2 < RMSO_1$.

The reliability of this criterion is presented in the plots of Figs. 2a to 2ℓ and 5a to 5ℓ where the iteration selected by this criterion is indicated by the letter R. We can see that this criterion determines the iteration yielding minimum average error with reasonably good reliability.

4.2.5. Alternative Object and Projection Revisions

Several types of revisions in both the object and projection domains were studied numerically.

The basic revision (BR) in the object plane was to set the object function to zero outside the circle of radius r_o in each iteration. If it is known from the physics of the problem that the object functions is non-negative, a modified revision (R) is used, namely, the object function is set to zero for $r > r_o$ and at any points in the region $r \leq r_o$ where negative values have been computed. Table 2 summarizes reconstructions of all test object functions using each revision (R and BR).

In the Table 2 the upper and lower numbers are the maximum and average percent errors in the iteration selected by the termination criterion. If there are also values in parentheses it means that the termination criterion did not yield the iteration with minimum average error. These minimum errors then appear in parentheses. The test object function (TOF), opaque obstacle (OB) and number of rays M are indicated in the first three columns of the Table 2. If it is not designated otherwise,

the number of projection N is matched to M in accordance with the condition (23).

The information in Table 2 indicates that revision R should be used whenever it is applicable.

Revision R in the object domain also has been combined with various revisions in the projection domain during the reconstuction process.

We know that each revision in the projection domain introduces a discontinuity of the first kind into the revised projection function. Such a discontinuity affects the reconstruction process very unfavorably (see the discussion in the paragraph 3.1) We unsuccessfully tried to alleviate this drawback by using only a fraction of the computed change of the projection function between two sequential iterations to define the new revised projection function. As we expected, this technique needed a substantially higher number of iterations to attain the best result; however, it didn't lead to a decrease of the maximum and average errors as we had hoped. One investigated case is demonstrated in Fig. 7, which shows the plots PE vs. ITR for the case when only 6% of the computed change of the projection function has been used to define the new projection function (Note the plots designated as A6.). For comparison, the results obtained without reducing the computed change of the projection function are presented in plots designated as A.

We also tried to reduce the unfavorable effect of the discontinuity of the projection function by "shrinking" the opaque obstacle. In each projection we added the first and last

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Table 2 - Percent Errors for Different Revisions in the ICM and for the Series Expansion Method of Ref. 5 (UChF).

IOF	OB	M	BR		R		R(N=M)	R1		R2		VChF (N=2·
IO1b	C3	21	1.5 0.2		1.5 0.2		1.3 0.3	1.5 0.2		1.5 0.2		9.0 2.0
	C6	21	5.7 0.9	(3.4) (0.8)	5.7 0.9	(3.3) (0.8)	5.9 1.4	5.5 0.9	(3.4) (0.8)	3.4 0.8		
	TS	20	14.4 1.6	(13.7) (1.6)	14.4 1.5	(13.7) (1.5)	11.6 1.9	12.9 1.6	(12.7) (1.6)	14.5 1.6	(13.7) (1.5)	
	TB	20	22.2 2.4	(21.1) (2.4)	23.0 2.2	(24.4) (2.2)	22.9 3.2	21.5 2.2	(20.7) (2.2)	23.3 2.1		
IO1d	C3	21	6.1 0.8	(6.2) (0.7)	6.1 0.5	(6.2) (0.5)	7.2 0.8	6.0 0.8	(6.0) (0.7)	6.2 1.0	(6.0) (0.8)	9.1 1.7
	C6	21	11.0 1.9		11.3 1.2		12.4 2.1	10.6 2.0	(9.6) (1.5)	7.6 2.0	(11.2) (1.9)	
	TS	20	14.9 1.8	(12.7) (1.8)	11.0 1.3	(9.1) (1.2)	14.2 1.9	8.5 1.2		11.0 1.3	(9.1) (1.2)	
	TB	20	19.2 2.4	(21.1) (2.3)	13.9 1.5		17.0 2.5	12.8 1.9		14.7 1.6		
IO2	C3	27	19.5 1.8		19.5 1.7		20.7 2.0	19.5 1.8		19.5 1.8		10.5 2.5
	C6	27	27.5 3.7		26.3 3.4		27.3 5.2	26.9 3.9		36.5 6.2	(30.5) (4.6)	17.5 4.0
	TS	25	23.4 2.8		18.7 2.7	(24.3) (2.6)	41.0 3.3	17.9 2.5		18.7 2.7	(24.3) (2.6)	
	TB	25	39.4 4.9	(54.4) (4.6)	33.6 4.2	(37.6) (3.9)	47.3 5.3	40.2 3.9	(38.5) (3.7)	32.8 4.1	(32.7) (3.9)	
	TS	20	16.1 2.9	(16.2) (2.8)	15.0 2.5	(14.9) (2.5)	18.2 3.5	19.4 2.6	(18.0) (2.6)	15.9 2.6	(15.2) (2.5)	
	TB	20	22.6 3.8	(23.3) (3.5)	20.3 3.2	(20.4) (3.2)	31.7 5.0	15.6 3.3	(15.0) (3.2)	20.3 3.3	(20.1) (3.2)	

sampling points from the initialized projection data in the blocked region to the set of the sampling points of the regions where the measured data were available, and considered the function values in all these points to be fixed for the iterative revision. In this way we in fact numerically shrank the opaque obstacle. The results obtained using this modified revision in the projection domain are presented in column R1 of Table 2. The modification didn't bring any obvious improvement and therefore was rejected.

We made a final attempt to alleviate the influence of the discontinuity of the revised projection function on the reconstruction: We transformed the problem of reconstruction from incomplete projections (in which the true object function is not determined unambiguously) to the case when one projection, after initialization of the missing projection data, was considered to be a complete projection with fixed data over the whole reconstruction process. This approach doesn't admit any ambiguity of the true object function. The results obtained with help of this method are in the column R2 of the Table 2. Comparing the results in this column with those in the column R we see that they are more often worse than better, so this modification of the revision in the projection domain also was eliminated.

In conclusion, the original revisions described in paragraph 3.1 were found to be the best choice. However, when revision R is applicable, it should be used rather than BR.

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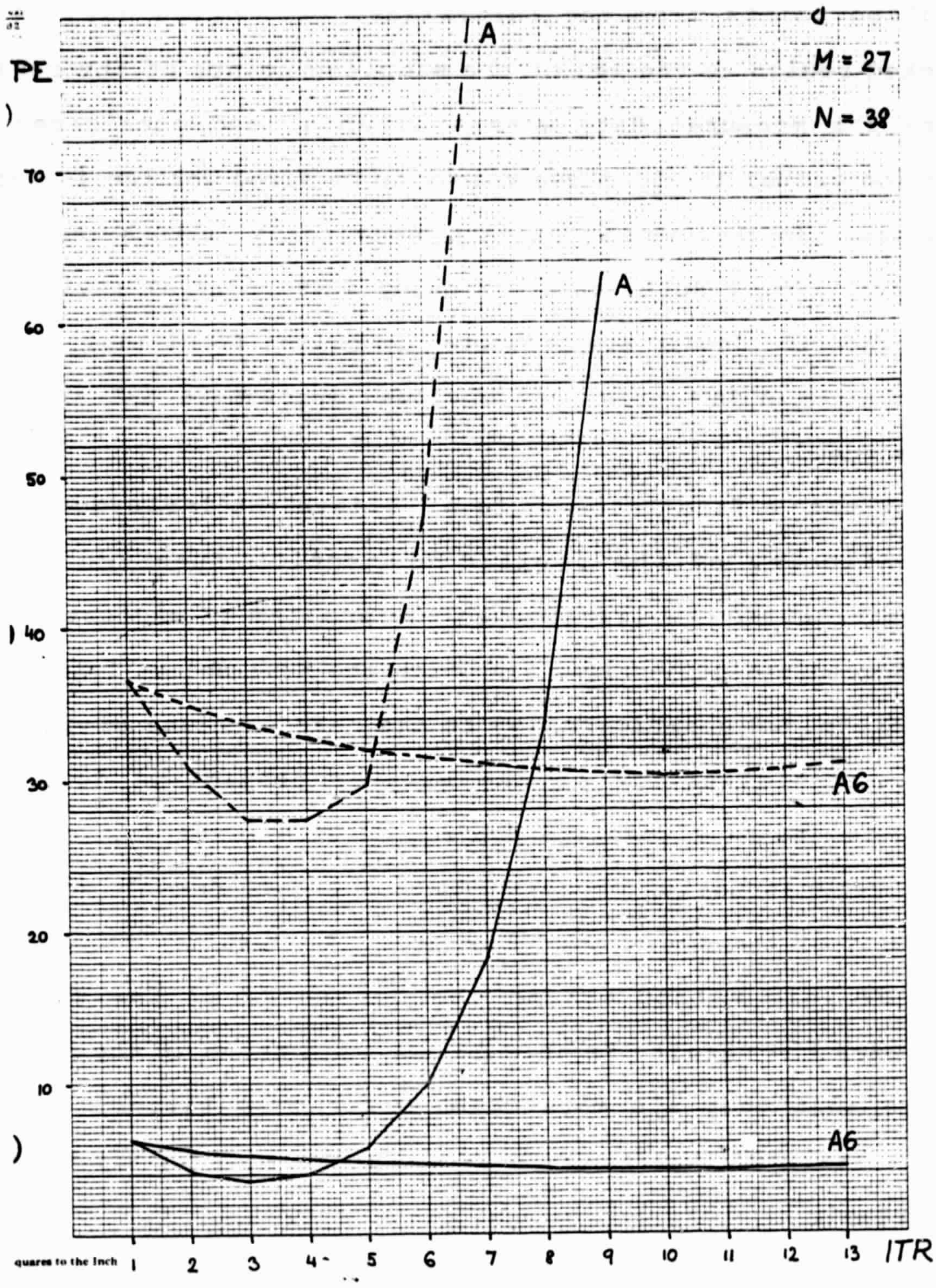

Figure 7

4.2.6. Summary

From the empirical study reported in this section it is clear that the iterative convolution method (ICM) is not convergent when an opaque obstacle is present in the field. In general as the iterations proceed the reconstruction initially converges toward the true object function, reaches a reconstruction with minimum error, and then diverges. For very simple object functions the number of iterations to achieve minimum error is small. It may even occur at the first iteration. As the amount of data, specified by the number of projections N and the number of data points per projection M, increases the curve of percent error (PE) versus number of iterations (ITR) becomes more concave and the point of minimum error becomes lower and occurs at a smaller number of iterations. However, there is "point of diminishing returns" beyond which increasing the amount of data no longer increases accuracy of reconstruction.

Several possible types of iterative revision in both the object and projection planes were studied, and the best approach was selected. Similarly, a rather reliable criterion for terminating the iterative process near the reconstruction with minimum error was established. Guidelines for selecting an optimum number of projections N for a given number of data points per projection M were developed. However, in real situations, determination of a suitable number of data points M is more complicated.

In aerodynamic interferograms data are usually recorded at the centers of fringes whose spacing is nonuniform and whose

number varies from projection to projection. The convolution algorithm requires equally-spaced data points in each projection, hence the M equally-spaced must be obtained by interpolation of the experimental data prior to running the code. In addition, the low quality of aerodynamic interferograms encountered in practice may require extrapolation of projections into the free stream. Considerable operator judgment may be required in these steps.

The results of our empirical study verified the obvious fact that the number of projections N required for accurate reconstruction increases with increasing complexity of the object field. The optimum numbers of projections in this study were in the range 10 to 30, i.e., views would be taken in intervals of 6° to 18°.

Some understanding of the accuracy of the ICM can be obtained by studying columns BR and R in Table 2. Clearly it depends on the complexity of the object function. Average (maximum) percent error varied from 0.2 (1.5) for test object field N01b + C3 to 4.9 (39.4) for test object N02 + TB. The latter is a worst case and could be improved to 3.2 (20.3) by using M = 20, rather 25, and using revision R, rather than BR.

Column VChF of Table 2 contains results of reconstruction using a series expansion method presented in ref. 5. Comparing these with the ICM results in Column R, it is seen that the ICM generally gives smaller average errors. Lower maximum errors were produced by the series-expansion method for object function N02, but the ICM produced lower maximum errors for functions N01b and

NØld.

Finally, Fig. 8 indicates the dependence of average and maximum reconstruction errors, attained with the ICM, on the size of the opaque object specified by the ratio r_c/r_o.

4.3. Increasing the Number of Projections by Interpolation

In paragraph 4.2.2 we have recommended how to select the number of projections N for a given M. N should be roughly given by condition (23) even though for some object functions it is too stringent a requirement. However, in no case should the number of projection N be smaller than M.

In some practical applications the number of available equally spaced projections may not be high enough. To overcome this trouble we tried to increase the number of available projections by interpolation. Since the projection function $\hat{f}(Y,\theta)$ is periodic in θ with period 2π (considering $Y \geq 0$ here) we assumed that triangular interpolation using harmonic analysis can be used. Of course, the periodicity of the projection function $\hat{f}(Y,\theta)$ is helpful for interpolation in the θ direction only for the values Y which are outside the radius of the region of the blocked projection data. If a line Y = const. is broken by the blocked region, trigonometric interpolation implies that the function $\hat{f}(Y = \text{const}, \theta)$ is periodic with the period defined by each individual interval of available data. Obviously, this impairs the accuracy of the interpolation. Only a circular opaque obstacle centered at the origin doesn't break any line Y = const.

The usefulness of azimuthal interpolation is indicated by Table 3. The first of three columns of this table indicates the

test object function, opaque obstacle and number of rays M using

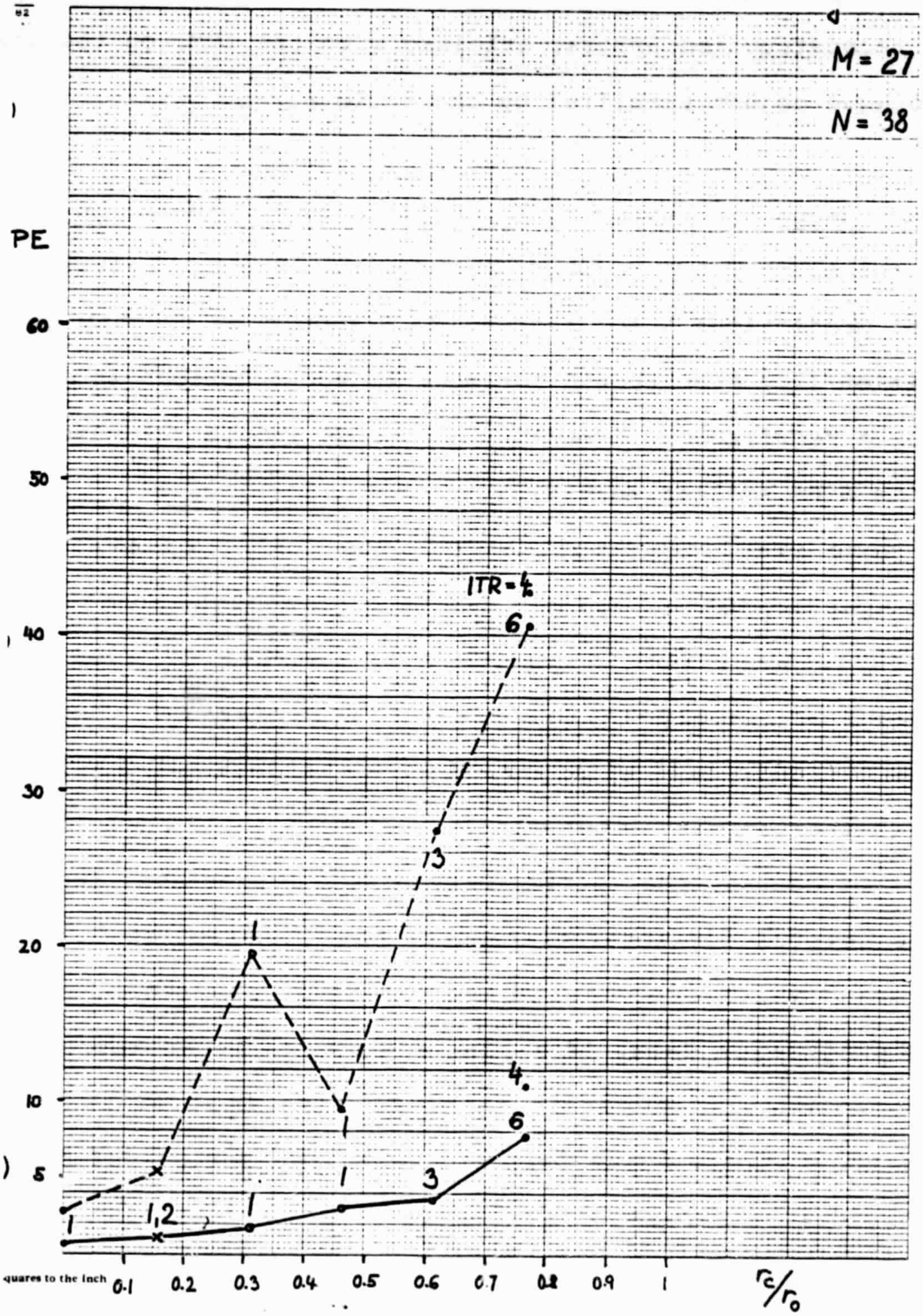

Figure 8

the same notation as Table 2. The columns designated by N show the number of available "measured" projections. The next column presents maximum and average percent errors for reconstruction using these "measured" projections. The change in errors obtained by increasing the number of projections by a factor of 2 or 3 using triangular interpolation can be seen by noting the errors in the columns designated by 2 or 3. In all cases the ICM was used with revision R in the object domain.

From the results in the Table 3 it is obvious that the increase of an unsatisfactory number of projections by interpolation can be very useful, particularly when a centered circular obstacle blocks a part of the projection data.

5. Program ICOM: The Iterative Convolution Code

ICOM is the final computer code for the iterative convolution method described in Sec. 3. The source program was written in two versions of FORTRAN IV. One version is for execution on a Digital Equipment Corporation LSI 11/23 microcomputer. Execution on this computer required from several minutes to one or two hours, depending on the amount of data and complexity of the field. The second IBM version was in standard FORTRAN IV and was executed under MTS (Michigan Terminal System) on an AMDAHL 470V/7 in less than 16 seconds of cpu time in allinstances. Both versions of the code ICOM are included in the appendix of this report.

The two-dimensional object function $f(x,y)$ is always considered to be zero everywhere outside the circle of radius r_o. This function is defined in a two-dimensional right-handed

Table 3 - Percent Errors for Increased Number of Projection by Interpolation

TOF	OB	M	N		2	N		3
NO1b	C3	21	14	3.6	1.5	9	6.1	1.4
				0.8	0.2		1.6	0.2
	C6	21	14	20.1	5.8	9	34.6	3.5
				4.4	0.9		8.0	0.8
	TS	20	14	13.0	18.0	9	17.2	22.1
				2.6	2.2		2.5	2.7
	TB	20	14	37.8	35.3	9	29.1	22.8
				6.1	3.3		4.7	3.3
NO1d	C3	21	14	7.5	5.7	9	7.5	5.9
				1.1	0.5		1.7	0.6
	C6	21	14	39.7	10.8	9	48.4	9.2
				4.4	1.2		7.7	1.2
	TS	20	14	23.4	9.8	9	16.7	12.3
				2.8	1.5		2.8	1.6
	TB	20	14	21.4	16.4	9	31.7	11.8
				2.9	1.5		3.7	1.5
NO2	C3	27	19	21.5	19.5	12	26.1	19.6
				2.6	1.7		6.1	1.7
	C6	27	19	39.6	26.3	12	57.9	34.9
				8.1	3.4		12.3	4.0
	TS	25	18	35.0	20.2		-	-
				2.8	3.4		-	-
	TB	25	18	43.4	44.5		-	-
				5.4	4.9		-	-
	TS	20	14	40.9	26.0	9	19.2	21.7
				6.0	3.6		4.1	3.4
	TB	20	14	41.4	30.3	9	31.4	25.6
				7.0	3.8		6.0	3.9

Cartesian coordinate system x,y with origin at the center of the circle. Modified polar coordinates R,ϕ also are used in the object domain. These coordinates are related to the Cartesian coordinate by the relations

$$x = R\cos\phi \qquad\qquad y = R\sin\phi \tag{49}$$

and are defined in the interval $-\infty \leq R \leq \infty$ and $0 \leq \phi \leq \pi$. The individual projections $\hat{f}(Y,\theta = \text{constant})$ are described using a coordinate system Y which is perpendicular to the optical rays used to form it. The first projection ($\theta = 0$) is formed by optical rays parallel to the x axis; the coordinate Y is then parallel to the y axis. Every other projection is described by rotating the axis Y counter-clockwise with respect to the xy coordinate system.

The detailed input directions and the output description of the program ICOM follow.

5.1. Input

The device name for the input is the number 5. The whole input consists of 3 + 2N records. The first record is an arbitrary text of up to 120 characters. If the IBM version is used the first character must be a blank.

The second record comprises the ten following numbers: MPLOT, MSGNV, IC, N, M, NET, NET2, D., WL., GDC. where integers and real numbers are without and with the periods, respectively.

The integer MPLOT determines the optional output.

MPLOT > 0 In this case the computed values of the object

function are arranged into a plot of the investigated cross-section of the object field. The values of the object function are computed and printed at the intersections of a square net. The vertical and horizontal lines of this net are parallel to the y axis and x axis, respectively.

MPLOT = Ø In this case the values of the object function are computed at the same points as in the previous case; however, the computed values are arranged into a table.

MPLOT < Ø The values of the object function are computed at the intersections of equally angularly spaced diameters of the circular object field with equally spaced concentric circles. The computed values are arranged into a table.

For more detailed information about the output arrangement see Sec. 5.2

The value of the interger MSGNV determines which of two possible revisions in the object domain is used.

MSGNV = Ø This alternative is prefered when it is known that the object function does not change sign anywhere in the object domain. The ICOM uses revision R (See Sec. 4.2.5.).

Otherwise the object function can change its sign in the object domain. Then ICOM uses the revision BR (See Sec. 4.2.5.).

The integer IC is set to zero if the operator does <u>not</u> wish

to increase the number of projections by the trigonometric interpolation discussed in the paragraph 4.3. The trigonometric interpolation is not a part of the program ICOM. It has been coded separately in the program INTEP. The integer IC is selected differently to be nonzero only if we use both the programs ICOM and INTEP. The integer IC is set equal to a positive multiplicative factor by which the number of projections is to be increased.

The integer N equals the number of available projections. They must be distributed with equal angular intervals. The maximum allowed value of this integer is 43.

The integer M equals the number of equally spaced sampling points over each entire projection including the edge points on the circle of radius r_o and the sampling points inside the blocked region. The maximum allowed M is 30.

The integer NET is connected with the output. It specifies the density of the sampling points at which the resulting object function is computed. If MPLOT $\geq$ 0 and the reconstructed object function is computed at the intersections of the square net overlapping the investigated cross-section of the object field then NET x NET is the number of the sampling points, i.e., intersections of the square net, at which the object function is computed. The side of the square net equals the diameter $2r_o$ of the circular region of nonzero object field. If MPLOT < 0 and the reconstructed object function is computed at the intersections of the "polar net", then NET defines the numberof the sampling points, i.e., intersections, on each diameter. The maximum allowed NET is 60.

The integer NET2 completes the information about the

distribution of the output sampling points when MPLOT < 0. In this case NET2 defines the number of the equally angularly spaced diameters of the output "polar net". The maximum permitted number of these diameters is 60. In connection with MPLOT ≥ 0 the value of the integer NET2 is arbitrary and has no influence on the computation. However, some value must be assigned to NET2 in the input record.

The real number D. is equal to the diameter $2r_o$ of the circular region containing the nonzero object function and may be expressed in arbitrary length units.

The real number WL. is the wavelength of light in <u>the same units</u> as the diameter D if the goal of the computation is the reconstruction of an object function from measured projections. However, for testing purposes we can set WL. = 0. to indicate that we wish to test the accuracy of reconstruction of a test object function TF specified as a function subprogram of the main program ICOM. In this option the percent errors of the reconstructed object function, rather than the function itself are computed.

The final real number GDC. of the first record enables one to compute the object function f(x,y) as the relative variation of the index of refraction n(x,y)

$$f(x,y) = n(x,y) - n_o \qquad (50)$$

or as the relative variation of the density $\rho(x,y)$

$$f(x,y) = \rho(x,y) - \rho_o \qquad (51)$$

The former representation is obtained by setting GDC. equal to zero and the latter is obtained by setting GDC. equal to the Gladstone-Dale constant. Then the computed density is in units of the Gladstone-Dale constant to the minus one. Note, that the selection of the constant WL. overrides the selection of the constant GDC.

The third record consists of 2N integers A_1, A_2,...A_{2N} which define the regions of the individual projections that are blocked by an opaque obstacle. Generally, each projection consists of three regions - a central region of blocked data and two regions of available data, one to either side of the opaque object. The blocked region in the k-th projection is defined by the pair of integer variables A_{2k-1}, A_{2k} where k = 1, 2,...N. For any projection the odd variable, A_{2k-1}, specifies the number of data points lying to the left of the opaque object (i.e. smaller Y) and the even variable, A_{2k}, specifies the number of data points lying to the right of the opaque object (i.e. larger Y). In the first projection Y = y and each next projection is rotated counterclockwise in equal angular intervals through 180°.

The boundary of the blocked region generally lies between two sampling points. We have found that the best accuracy is obtained if the data are smoothly extrapolated to the first sampling point inside the blocked region. This point then is included with the measured data.

Because the sampling points at the edge of the field ($r = r_o$)

must be included in the data set no integer A_n can equal zero. An error message will result if $A_n = \emptyset$. Another restriction is the $A_{2k-1} + A_{2k} \leq M+1$. This sum equals $M+1$ if no opaque object is present. In this latter case one central sampling point should be included in both the "left-" and "right-hand" regions of data.

The remaining 2N records are the $\sum_{1}^{2N} A_n$ real values of the measured projection function expressed as interference fringe orders. It sould be reemphasized that the number of values of the projection function must equal the number of sampling points in each projection specified by the pair of variables A_n.

Each of next 2N records is related to one value A_n of the third record. The fourth record consists of A_1 function values of the "left hand" region of the first projection, the fifth record consists of A_2 function values of the "right hand" region of the first projection and, generally, the (2k + 2) or the (2k + 3)-rd record consists of A_{2k-1} or A_{2k} function values of the "left hand" and "right hand" regions of the k-th projection, respectively. The individual function values of each record are always ordered with increasing values of the coordinate Y, i.e. from the edge value of the "left hand" region towards the edge value of the "right hand" region. Therefore the first value of each record for which A_n has an odd subscript and the last value for which A_n has an even subscript must be zero. (The function values at the edge points are zero.)

Obviously, these 2N records are not required when in the second record the option WL. = Ø. is chosen.

5.2 Output

The device name for the output is the number 6. The arrangement of the output supposes that a printer with at least 128 printable columns is available. Before printing the reconstructed object function at selected sampling points, the following data are printed: The information in parentheses is printed optionally and the printed numbers are replaced by symbols if they have been introduced or simply by X in the output format:

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

An arbitrary text up to 120 characters

ZERO OBJECT FIELD OUTSIDE THE RADIUS: r_o

INTERPOLATION COEFFICIENT: IC

(WAVELENGTH: WL) only for WL ≠ 0

(GLADSTONE-DALE CONSTANT: GDC) only for GDC ≠ 0

(NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED) only for MSGNV = 0.

NUMBER OF PROJECTIONS : N   NUMBER OF RAYS IN EACH PROJECTION: M

(PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

```
    1        x., x....
    2        .
    .        .
    .        .
    .        .                          ) only for WL ≠ 0
```

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE

PROJECTION ERROR:

1	x	x
2	x	x
.	.	.
.	.	.
.	.	.

RESULT IS FROM ITERATION: X

MISSING PART OF THE PROJECTION DATA IN PERCENTS: X

(NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE ERRORS IN PERCENTS:

x x x) only for WL = Ø

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: X

(X and Y COORDINATE MULTIPLIED BY : X) only for MPLOT $\geq$ Ø

(THE RADIUM R IS MULTIPLIED BY: X) only for MPLOT < Ø

(THE OBJECT FUNCTION MULTIPLIED BY: X) only for WL $\neq$ Ø

After these data the print of the values of the reconstructed object function in the refractive index representation (WL $\neq$ Ø, GDC = Ø) or in the density representation (WL $\neq$ Ø, GDC = Ø) or the print of the percent error of the reconstructed object function (WL = Ø) follows. The arrangement of this part of the output data depends on the value of MPLOT.

Let us first suppose MPLOT > Ø. Then the values of the reconstructed object function or its percent errors are computed and printed at the NET x NET intersections of a square net whose vertical and horizontal lines are parallel to the y- and x-axis, respectively. The width of this net equals the diameter $2r_o$. The values of the x- and y-coordinates are printed, with an accuracy of 1% of the radius r_o, on the upper horizontal and left vertical margin of the plot, respectively. The values of the

reconstructed object function or its percent errors are also printed, rounded to 1% accuracy of the maximum value of the reconstructed object function. Four asterisks are printed at the sampling "points" in the region occupied by an opaque obstacle and also outside the circular region of radius r_o (including the edge points). We know that the object function is zero on this circle and everywhere outside it. Using this printing technique we obtain not only the values of the reconstructed object function at the sampling points but also the real geometrical image of the circular cross-section of nonzero object field with an embedded opaque obstacle. The geometrical image of the real cross-section can be formed only up to NET = 30. For NET > 30 the width of the printer is not sufficient for making this geometrical image. In this case the output is arranged in such a way that the geometrical image of the investigated cross-section would be obtained if each even line of the plot were translated to the right and attached to the end of the preceding odd line.

The function values at the sampling points of the square net also can be arranged into a table. The x and y coordinates are indicated at the top of this table and the values of the reconstructed object function, or its percent errors, are without indication. This kind of the output is obtained by setting MPLOT = 0.

By selecting MPLOT < 0 a table similar to that described above is printed, but the values of the reconstructed object function or its percent errors are computed at the sample points of the "polar net." In the top of the table the designation DEG

and R are instead of X and Y. The NET printed values for DEG = 0 (ϕ = 0) are those along the x axis. The polar axis is then rotated counterclockwise in increments of 180/NET2 degrees.

Different examples of the output are in the appendix to this report.

6. Program INTEP

In Sec. 4.3. it was shown that it can be useful to increase number of available projections by the trigonometric interpolation in the azimuthal direction. The program INTEP is used for this purpose.

The source program has been written in FORTRAN IV in both modified version as the program ICOM. Copies are enclosed with this report.

The input device is designated by the number 4 and the ouput device by the number 5 (which is the input device name of program ICOM). The input of the program INTEP is exactly the same as the input of the program ICOM. Only the quantity IC of the first record is set equal to 1, 2, 3... instead of 0 if we want to increase the number of the available projections 1, 2, 3...times, respectively. The output of the program INTEP is arranged in such a way that it can directly serve as input to the program ICOM. A file containing the output of INTEP can be used directly as an input file for ICOM. The number of projections printed in the output of the program ICOM is the number of projections after interpolation. The number of projections before interpolation is obtained by dividing this number by the printed value of IC $\neq$ 0.

Note that the program INTEP also contains the function subprogram TF. For the choice WL = 0 this subprogram must be the same for both the main programs ICOM and INTEP.

7. ICOM Reconstruction of Data from Aerodynamic Experiments

The codes developed during this investigation were used to reconstruct aerodynamic density fields using data supplied by George Lee of NASA Ames Research Center. We were supplied with photographs of dual-plate holographic interferograms of subsonic windtunnel flows past a circular cylinder of radius $r_s = 25.4$ mm with a hemispherical nose.

One data set was for the axisymmetric flow when the cylinder was set at zero angle of attack. The second set was for the asymmetric flow when the cylinder was set at an angle of attack $\alpha = 5.5°$.

The density distribution in the flow fields were described in our analysis using a Cartesian coordinate system with the z axis parallel to the axis of the wind tunnel and pointing in the direction of flow. The origin was placed at the stagnation point of the cylinder at zero angle of attack and the density distribution was reconstructed in several planes z = constant. Similarly, for the asymmetric flow about the cylinder at angle of attack $\alpha = 5.5°$, the origin of the coordinate system was located where the hemispherical nose had a single point of tangency to the xy plane normal to the flow direction. Thus for $z > 0$ the test model blocked part of each projection.

7.1 Axisymmetric Flow ($\alpha = 0$)

The iterative convolution method (ICM) was developed for general computer tomographic reconstruction of asymmetric flow fields from sets of interferograms when an opaque object blocks part of the field. However, it can also be used for the reconstruction of axisymmetric flows from a single interferogram. We first tested the program ICOM by using it to reconstruct such an axisymmetric flow field and comparing the results with a reconstruction from the same data computed with a code specifically based on the Abel transform for reconstruction of axisymmetric fields [15].

The interferogram, recorded in an air flow at a Mach number M = 0.6, is shown in the appendix. In theory, the interferogram should be perfectly symmetric about the z axis and the free stream should contain no fringes. However, the actual interferogram is not exactly symmetric, and the free stream region contains many fringes, which can be considered to be noise in the data. The extraneous fringes may be caused by turbulance, deformation of the windows or tunnel structure, and by emulsion shrinkage or swelling in the two holograms used to form the interferogram. It therefore was necessary to use judgement and information from a numerical prediction of the flow to: (i) determine the zero-order fringe, (ii) define the radius r_o beyond which the density change can be assumed to be zero, and (iii) decide which half of the interferogram is more accurate.

Fig. 9 shows the input data which were used in the form of a plot of fringe order versus radial coordinate Y. The solid curves are interpolations among fringe orders and the dashed

curves are smooth extrapolations into the free stream. Each curve is labled with the z location of plane of reconstruction in millimeters. Short vertical lines denote the edge of the opaque test model when it blocks part of the field of view.

Figs. 10 a, b and c show the reconstructed density distribution (FUNCTION) as a function of radius (POSITION) in centimeters in the planes z = 0, 12.7 and 25.4 mm respectively. The dark curves were produced by the code ICOM and the light curves were produced by a special code for reconstruction of axisymmetric fields. The agreement between the two is excellent.

7.2 Asymmetric Flow ($\alpha = 5.5^\circ$)

We were supplied with interferograms of this flow for M = 0.6 and M = 0.8 recorded with viewing directions every 10° over the full 180° range. Because this flow is symmetric about the plane y = 0, this set of data should be redundant, i.e. the interferogram for θ, $0 \le \theta \le 90°$, should be identical to, or a mirror image of, that for $(180^\circ - \theta)$.

These sets of data contained considerable noise due to a variety of experimental problems. Density field reconstructions could be made only after a number of *ad hoc* assumptions were made to interpret the interferograms:

(i) Because the zero order fringe was not identifiable, we postulated that the fringe order at the stagnation point x = y = z = 0 was the same in each interferogram at a given Mach number.

(ii) We further postulated that the order of the fringe at x = y = z = 0 was 3 for M = 0.6 as in the case of = 0, M = 0.6. The corresponding fringe order was taken to be 5 for M = 0.8.

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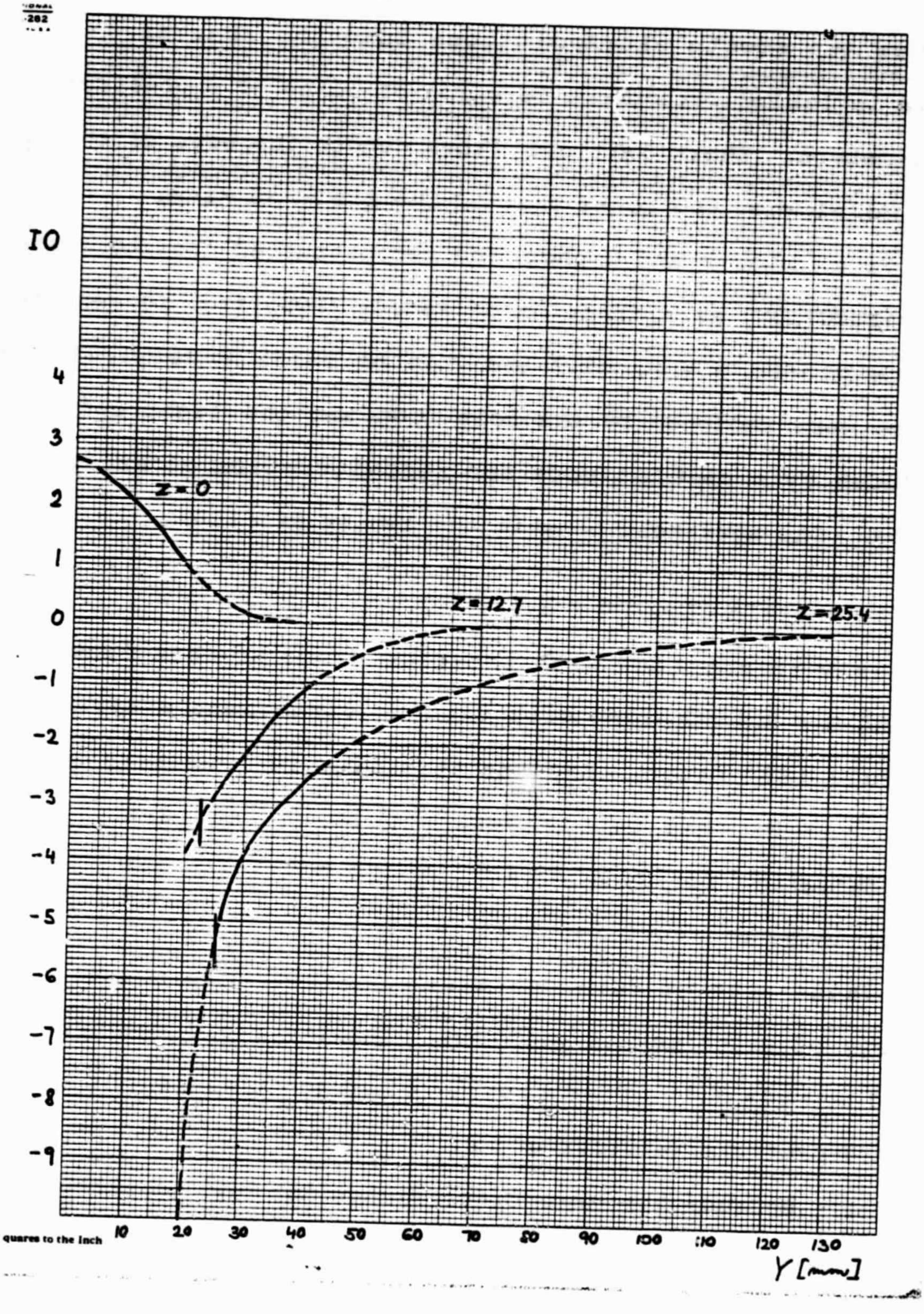

Figure 9

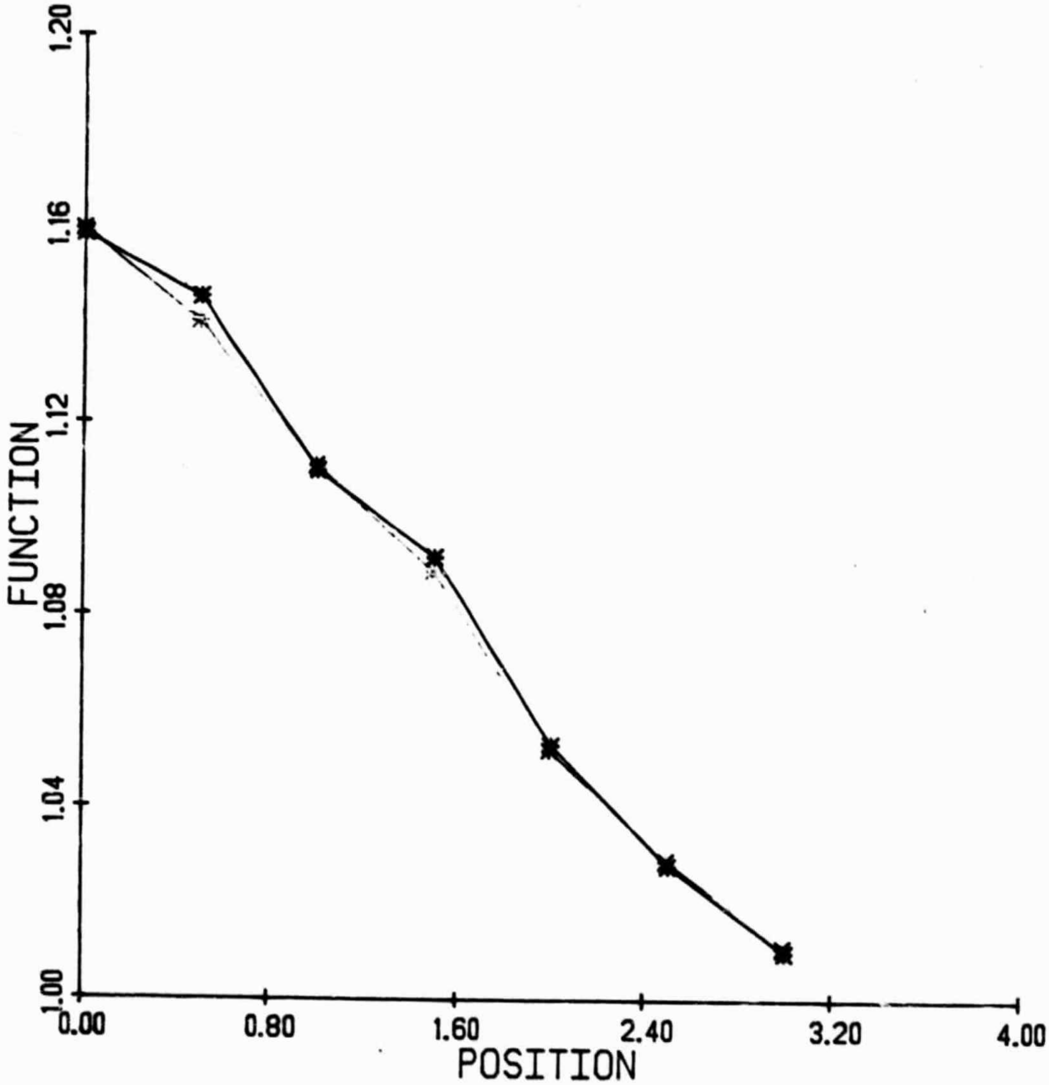
1.20
1.16
1.12
1.08
1.04
1.00
FUNCTION
0.00
0.80
1.60
2.40
3.20
4.00
POSITION

Figure 10a

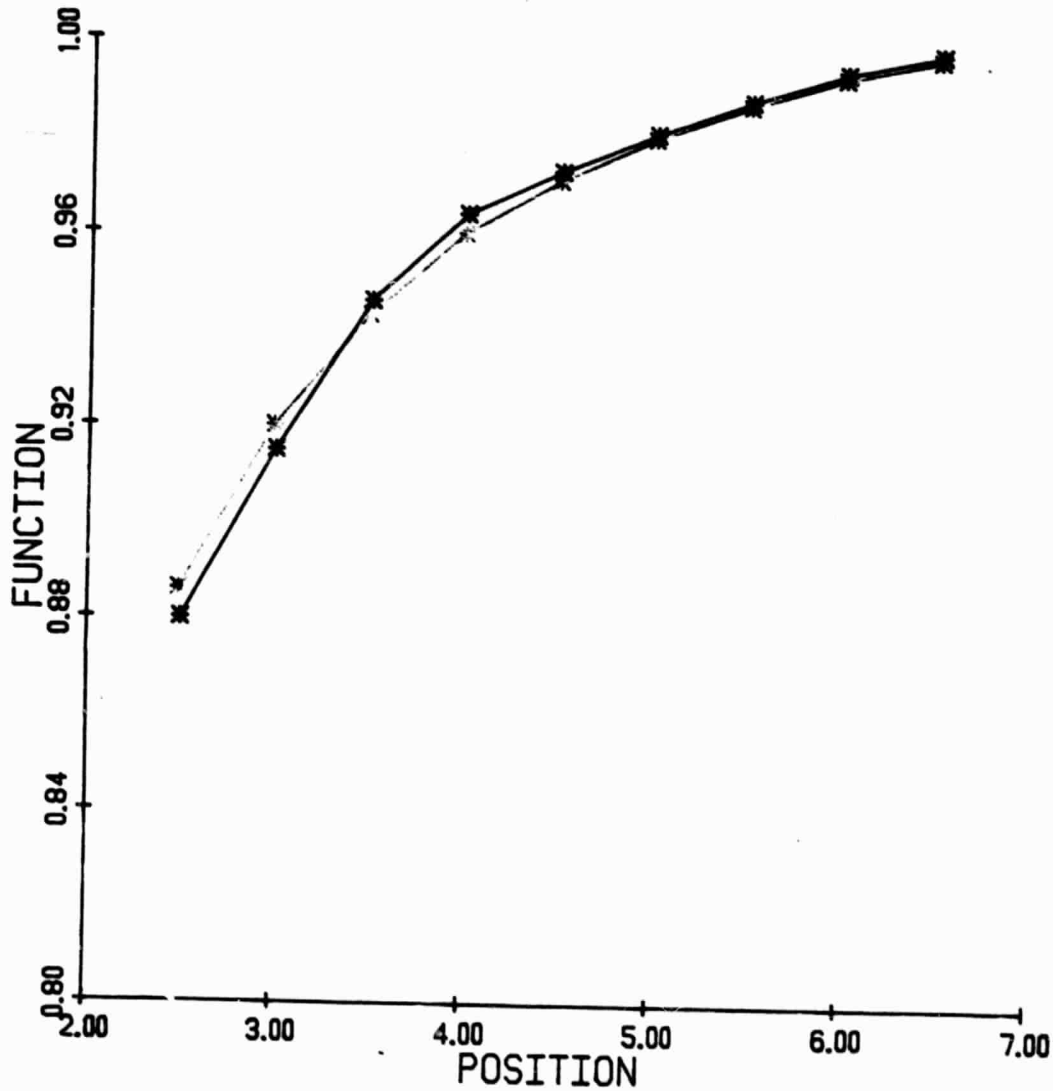
FUNCTION
POSITION
1.00
0.96
0.92
0.88
0.84
0.80
2.00
3.00
4.00
5.00
6.00
7.00

Figure 10b

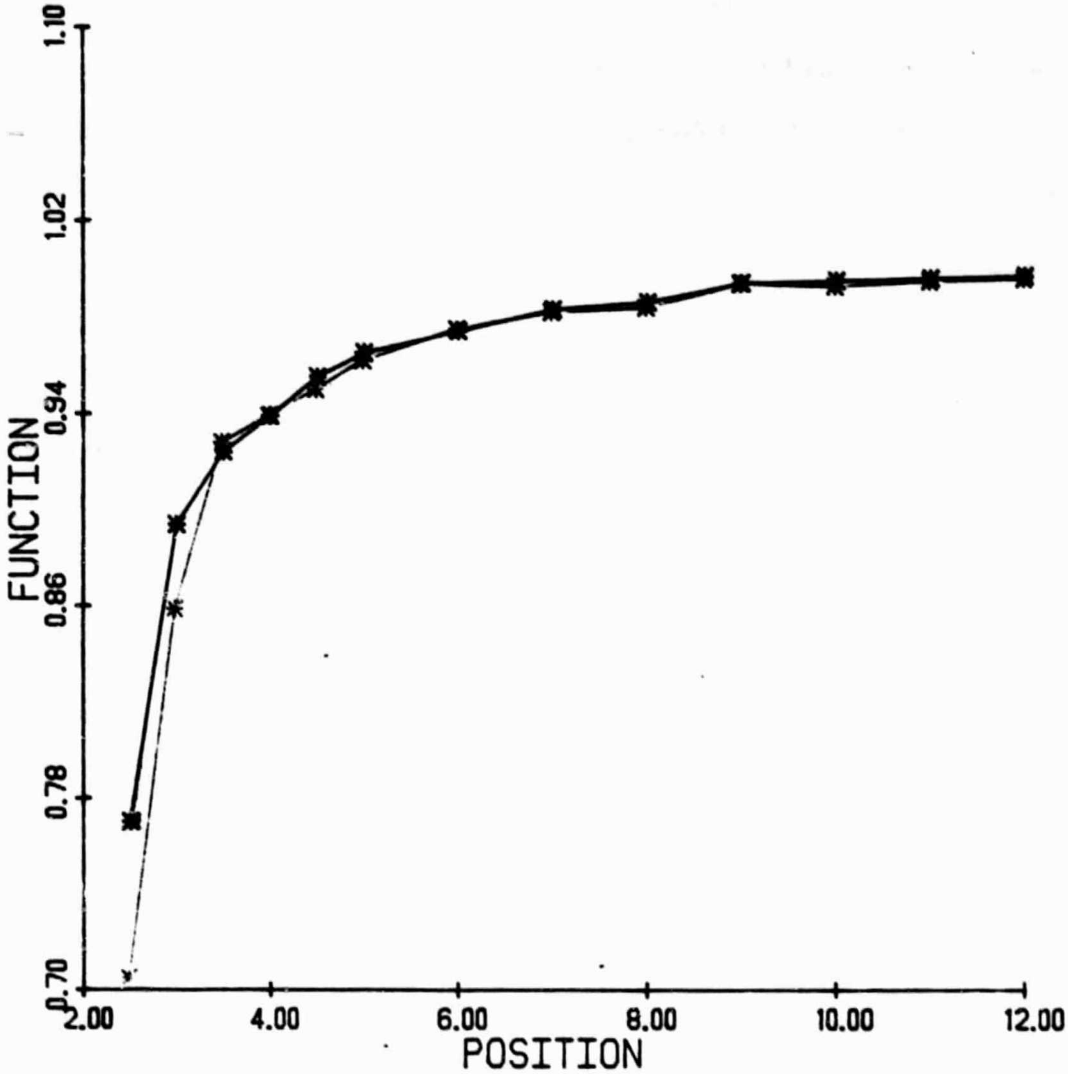
FUNCTION
1.10
1.02
0.94
0.86
0.78
0.70
2.00
4.00
6.00
8.00
10.00
12.00
POSITION

Figure 10c

This value was arrived at by estimating the zero order fringe in each interferogram to be that which is the first to greatly broaden and diffuse into the free stream. The orders estimated in this way were averaged to arrive at the value 5.

(iii) The order of interference fringes was assumed to decrease monotonically from that at $x = y = z = 0$.

Because the ICM performed well in the empirical studies of noise-free data described earlier in this report, we believe that inaccuracies and artificial fluctuations in the reconstructions of the experimental data are due to experimental noise and our consequent inability to evaluate the interferograms with good precision. In order to further evaluate the ICM we reconstructed the same data sets using a series expansion algorithm. These results are described in Sec. 10.

Having calibrated all the interferograms we had to find the projection of the axis z into each interferogram. In each interferogram the projection of the mechanical axis of the cylinder could be determined with the help of the shadow image of the cylinder. Knowing this projection and using the simple relation

$$\tan \sigma = \tan \alpha \sin \theta , \tag{52}$$

where σ is the angle $\alpha = 5.5^\circ$ projected into the θ-projection, we have constructed the projection of the z axis in each interferogram. The corresponding line had to go through the tangential point of the plane $z = 0$ and the shadow image of the cylinder, i.e. point $x = y = z = 0$.

We reconstructed the density field in the cross-sections z = Ø, 1.27 and 2.54 cm. The dependence of the interference order IO of the projection function on the position Y is shown in the sets of plots. For the flow at M = Ø.6 these plots are in Fig. 11a to 11j and for the flow with M = Ø.8 they are in Fig. 12a to 12j. The designations a, b, c, d....j correspond to $\theta = \text{Ø}^\circ, 1\text{Ø}^\circ, 2\text{Ø}^\circ, 3\text{Ø}^\circ(-3\text{Ø}^\circ)...9\text{Ø}^\circ(-9\text{Ø}^\circ)$, respectively. In these plots the circles and crosses represent the measured values and the curves show our visual interpolation and extrapolation. For z = Ø there are only positive values of interference order and projection data are available over the whole projection domain. For z = 1.27 and 2.54 cm the orders of the interference fringes are only negative and the central part of the projection function is blocked by the test model. The projection functions for z = 2.54 cm always lie below those for z = 1.27 cm. For interpolation we tried to construct symmetric curves for $\theta = \text{Ø}^\circ$. For z = Ø, following the physics and mathematics of the problem we tried to keep the area under the curve IO vs. Y roughly constant for all projections. In each cross sectional plane, z = 0, 1.27 and 2.54 cm, the radius beyond which the density difference is essentially zero was estimated by visual inspection of the interferograms and extrapolated data.

Equally distributed values of the projection function taken from the interpolation/exterpolation curves of Figs. 11 and 12 were used as input data for the programs INTEP and ICOM. We used the program INTEP to double the number of available projections. (The program INTEP was not used for the reconstruction of the

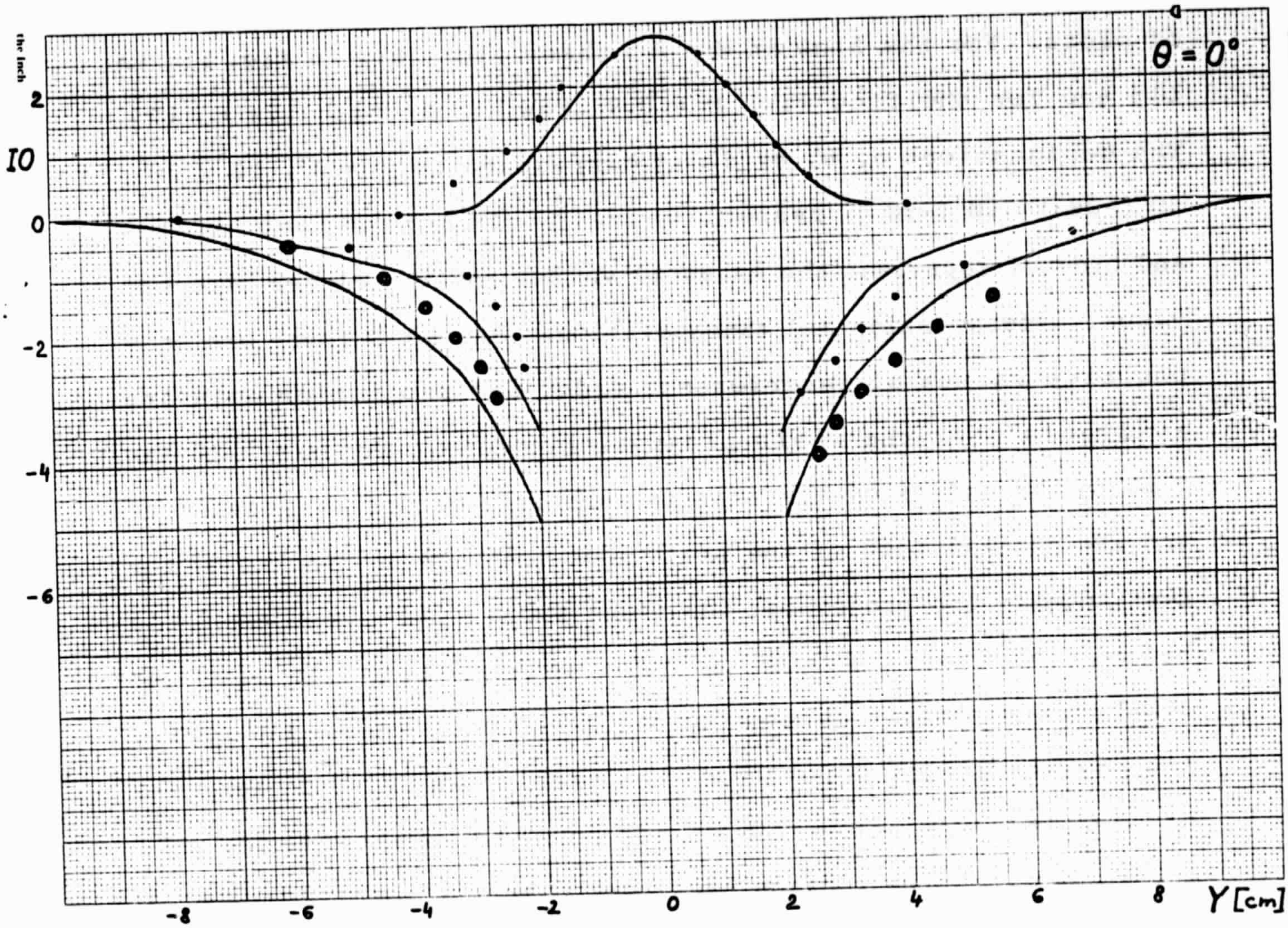

Figure 11a

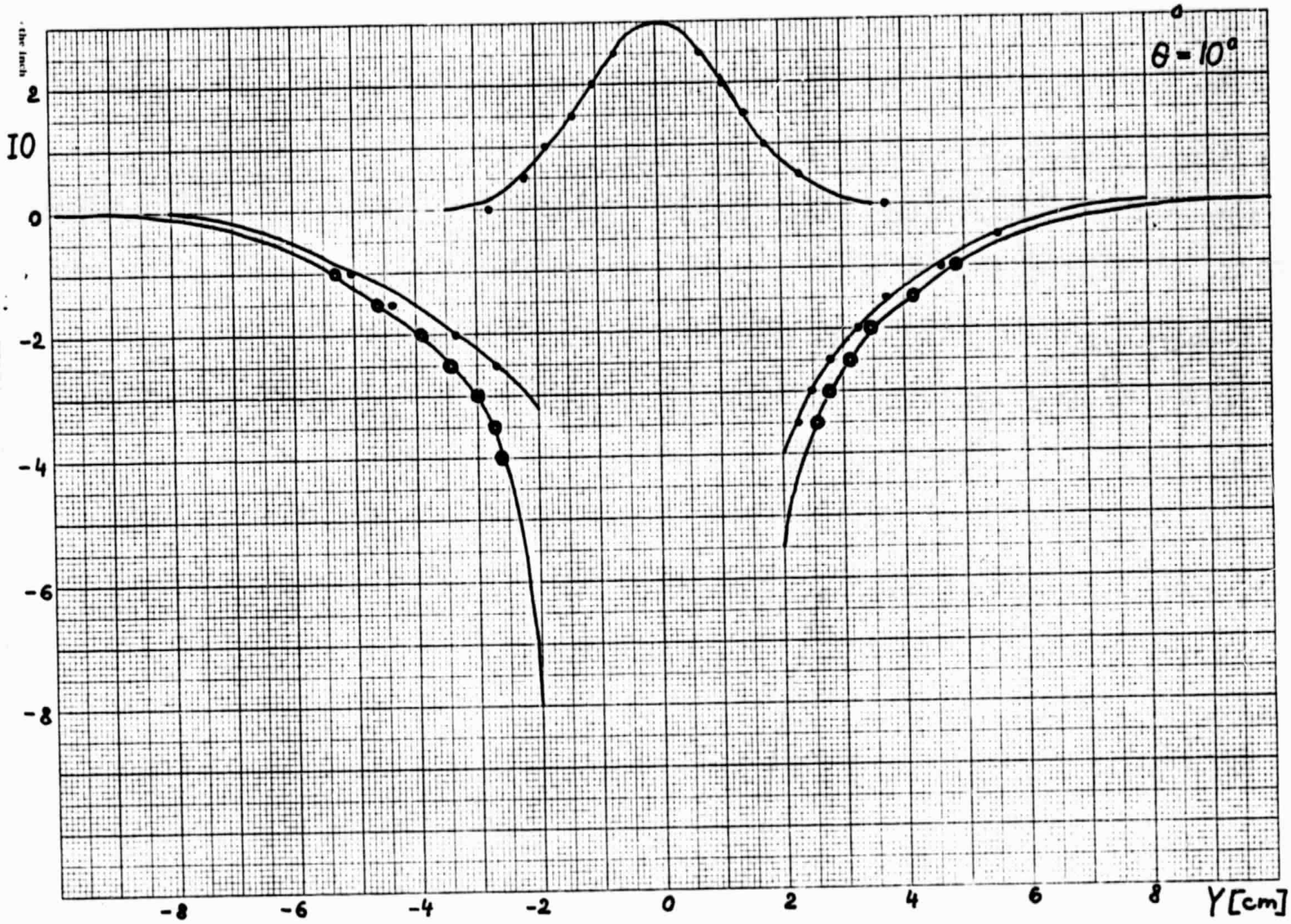

Figure 11b

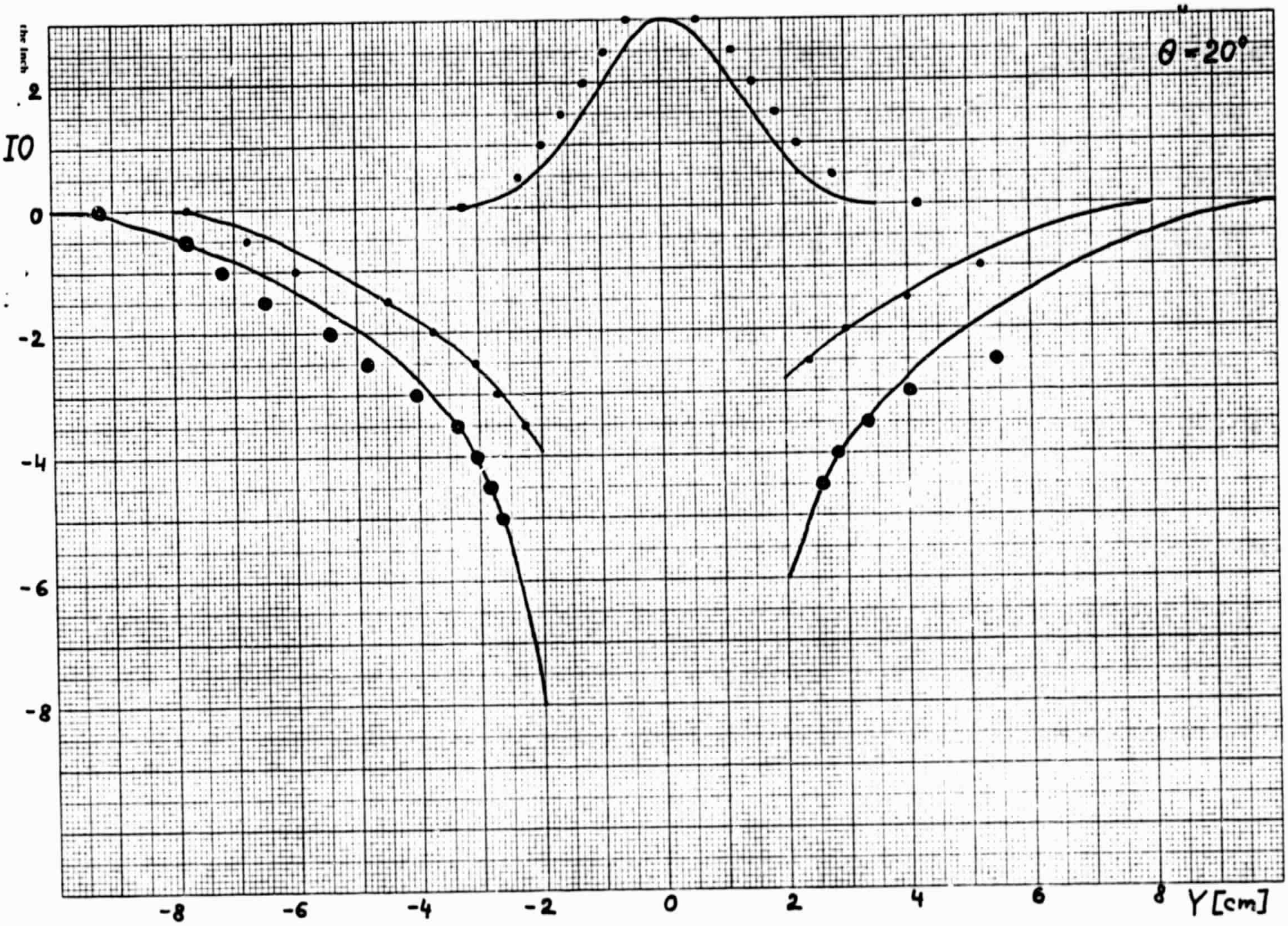

Figure 11c

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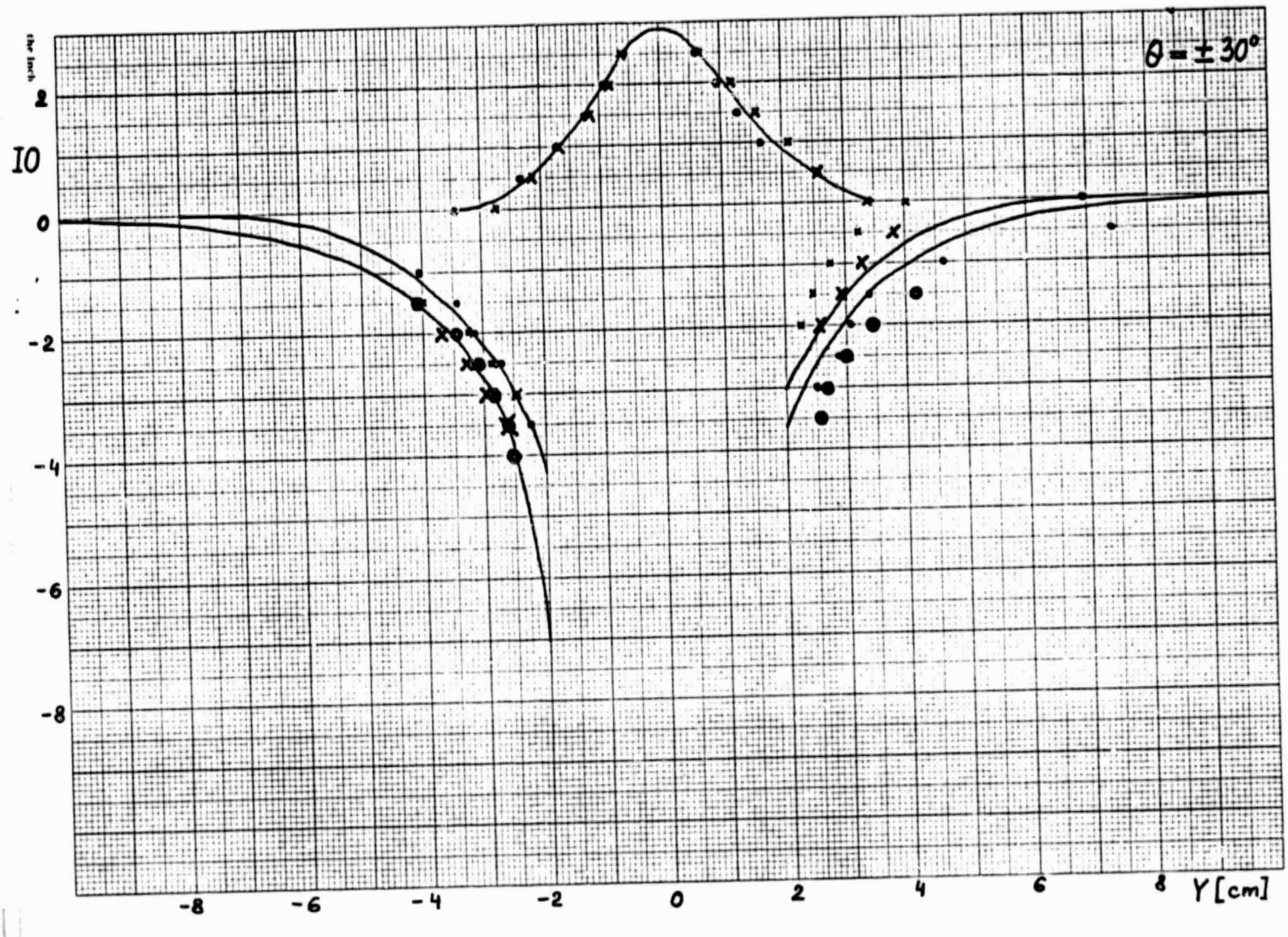

Figure 11d

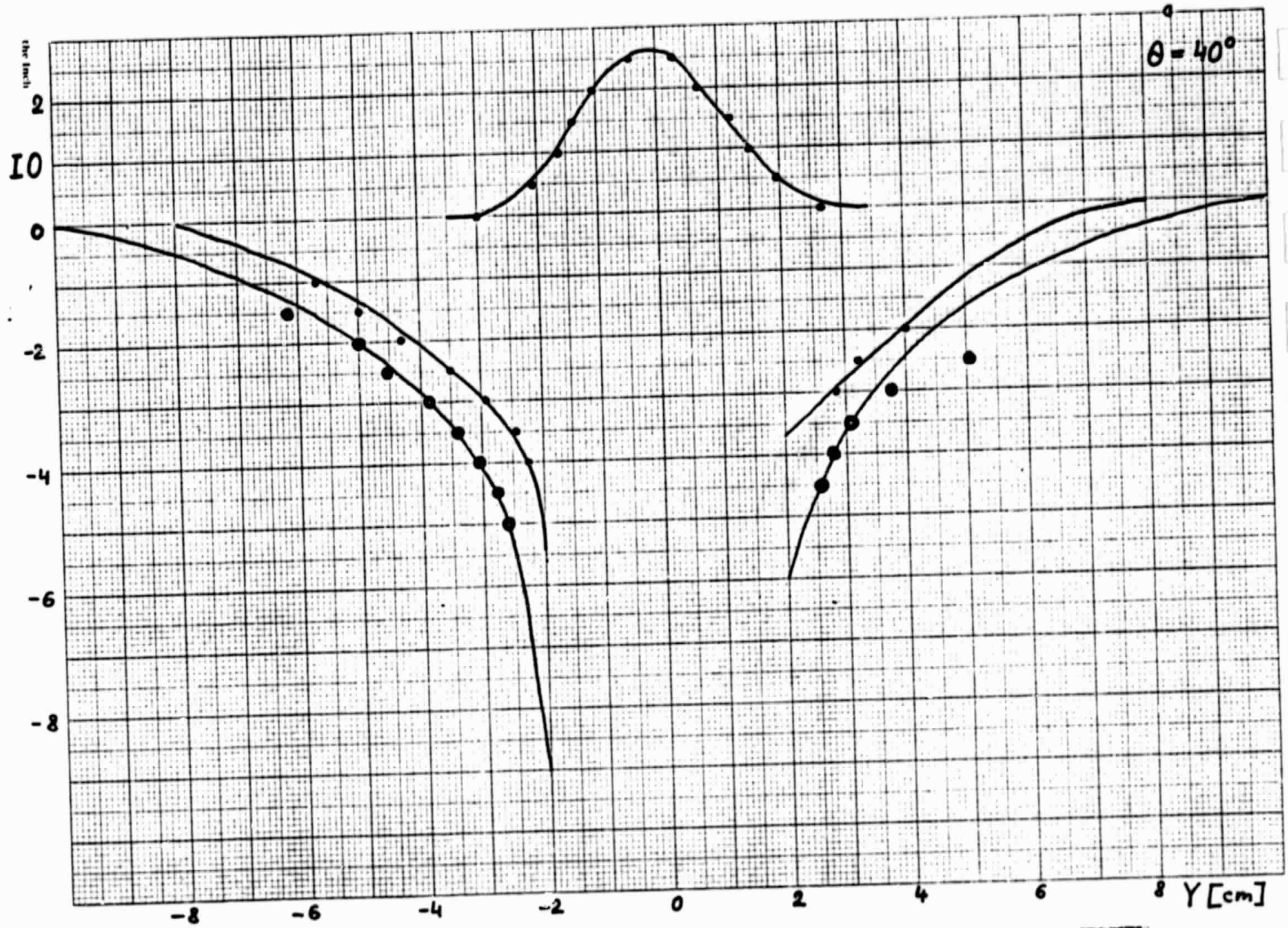

Figure 11e

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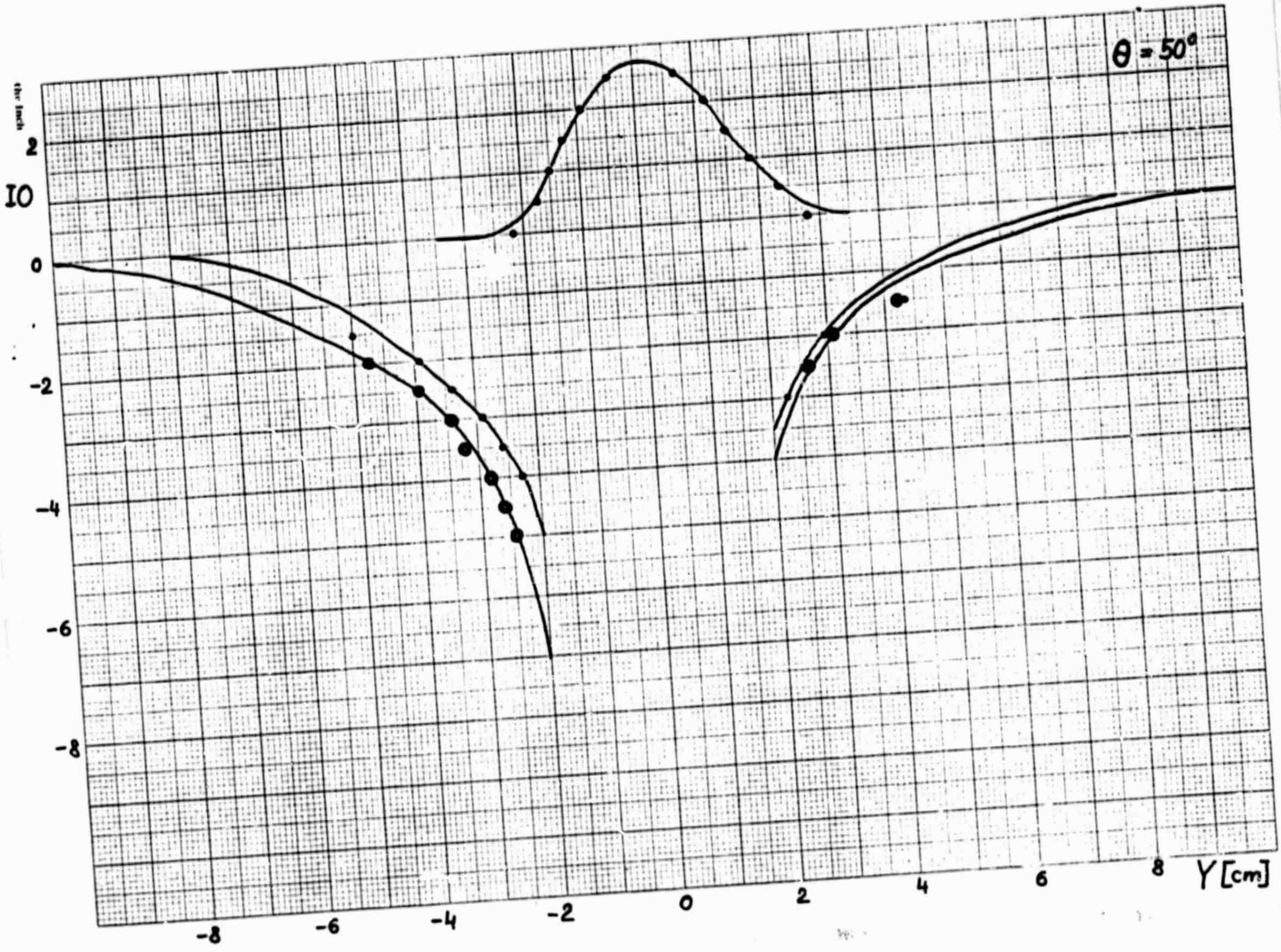

Figure 11f

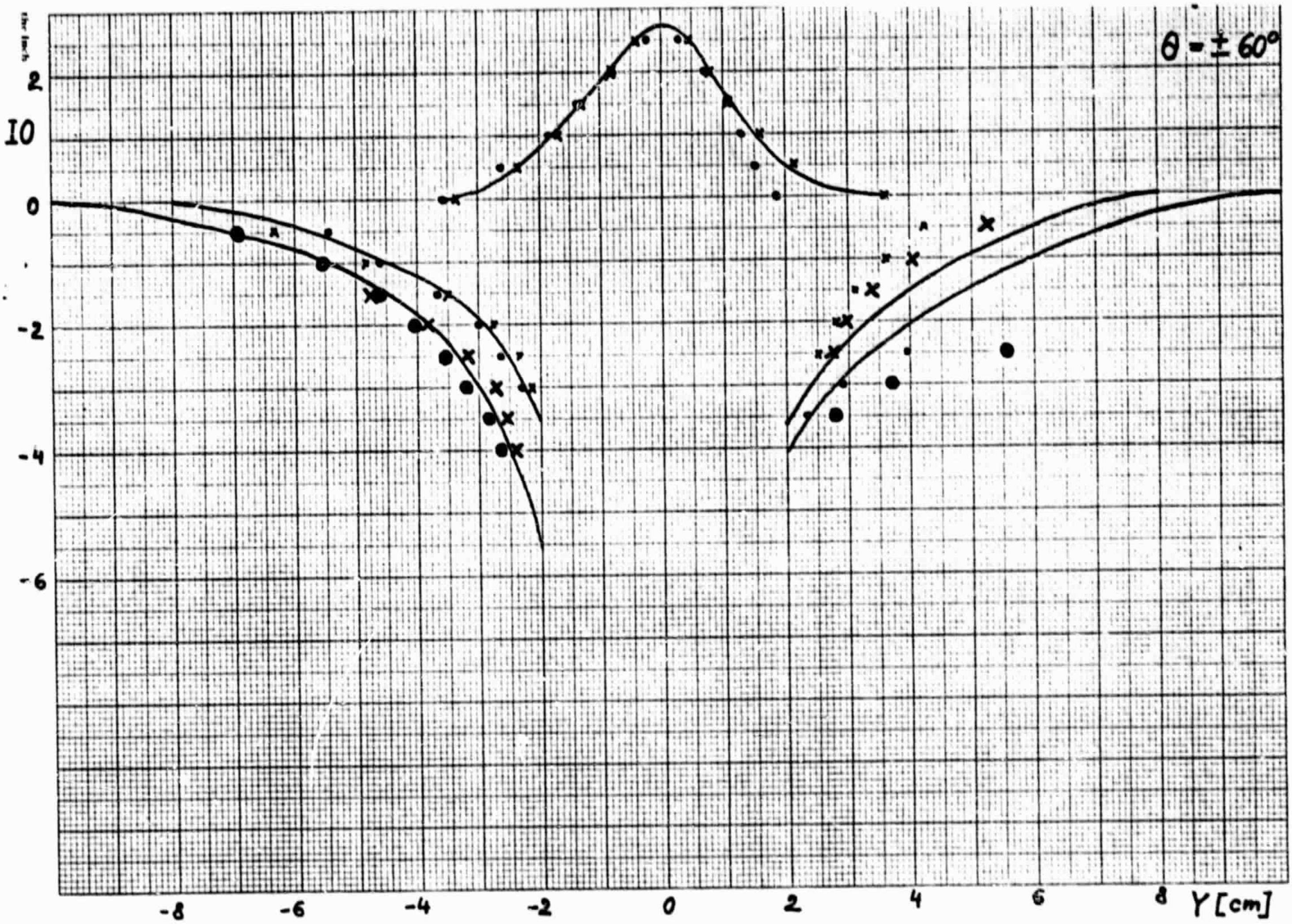

Figure 11g

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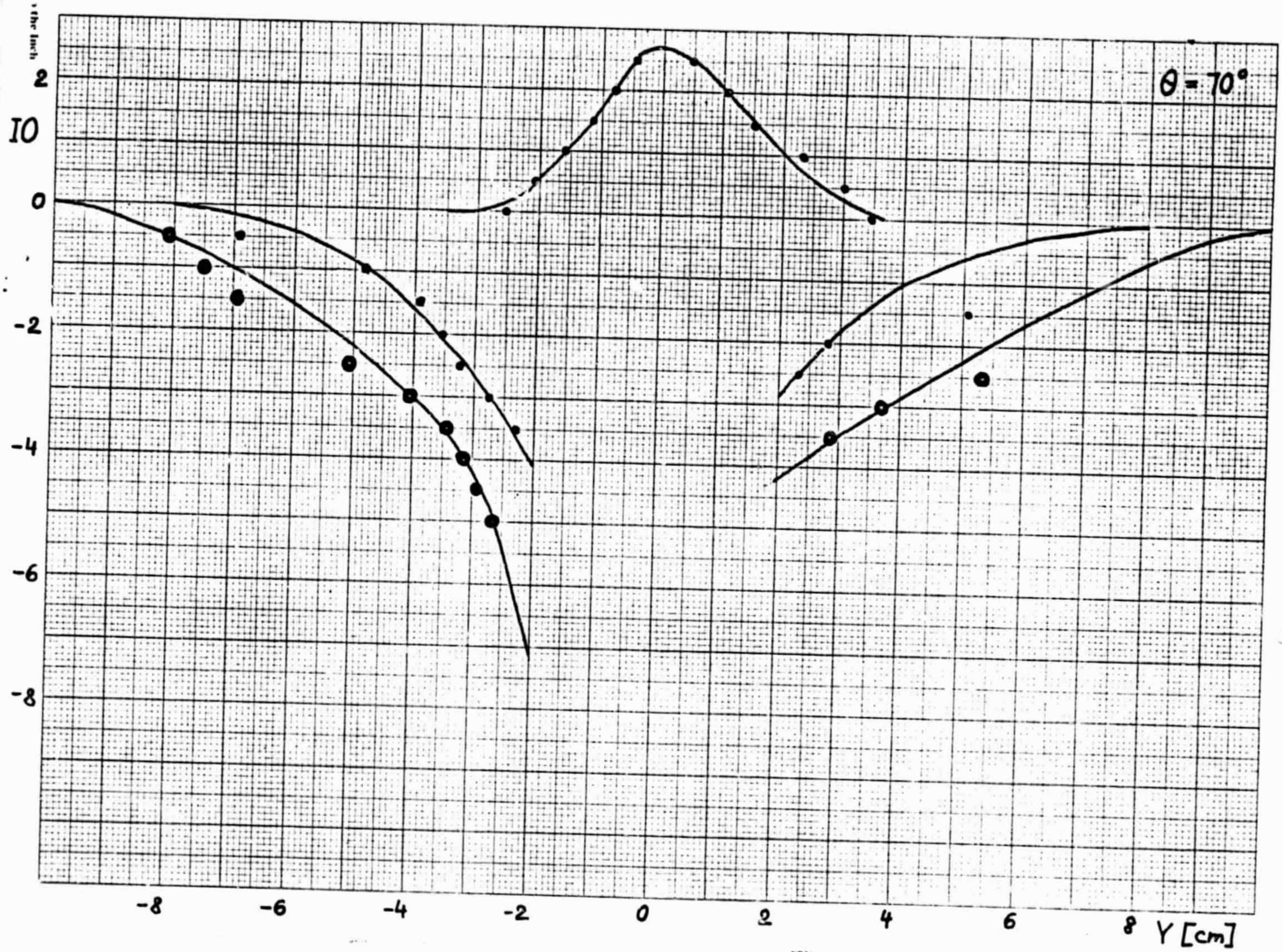

Figure 11h

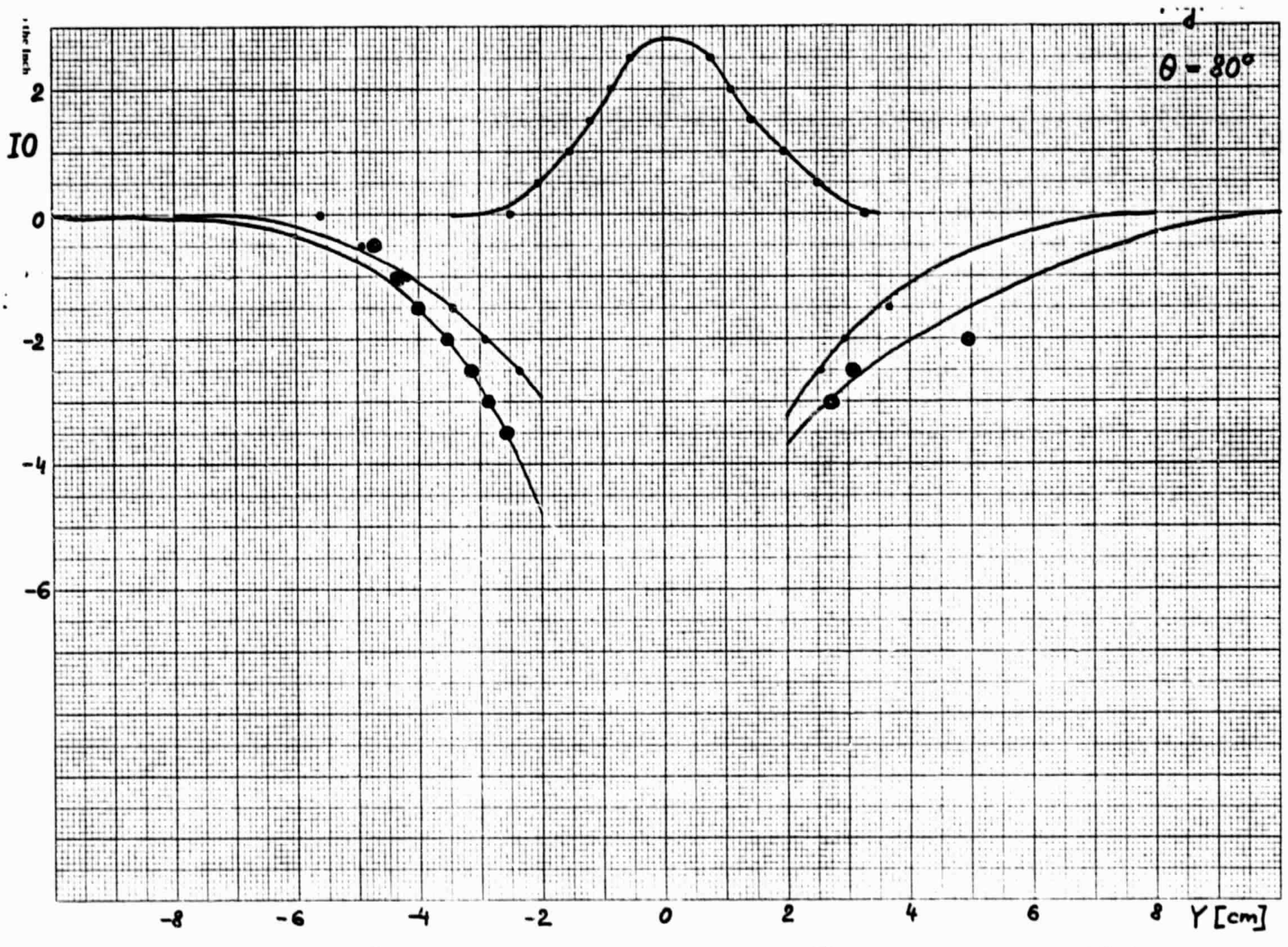

Figure 11i

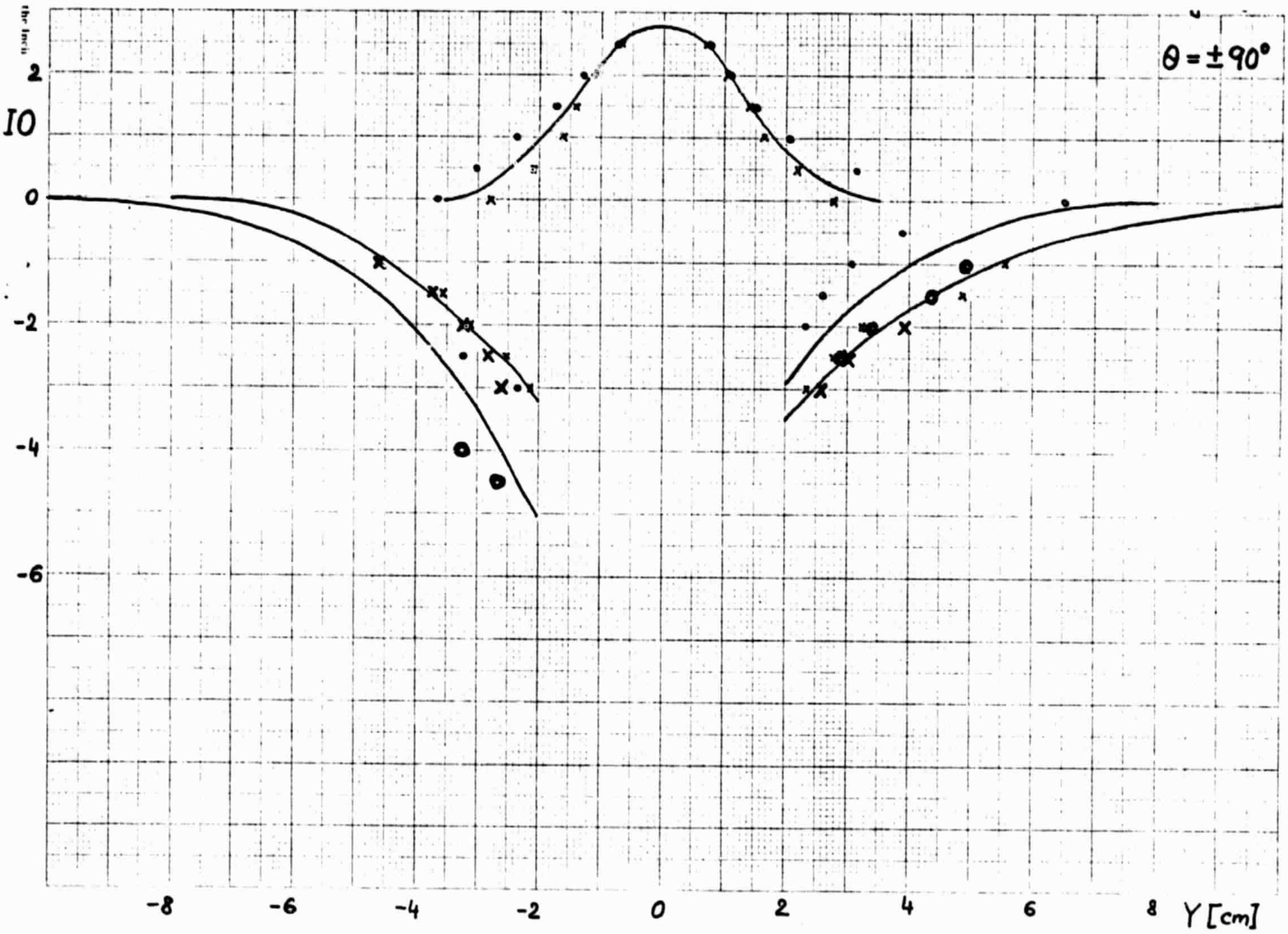

Figure 11j

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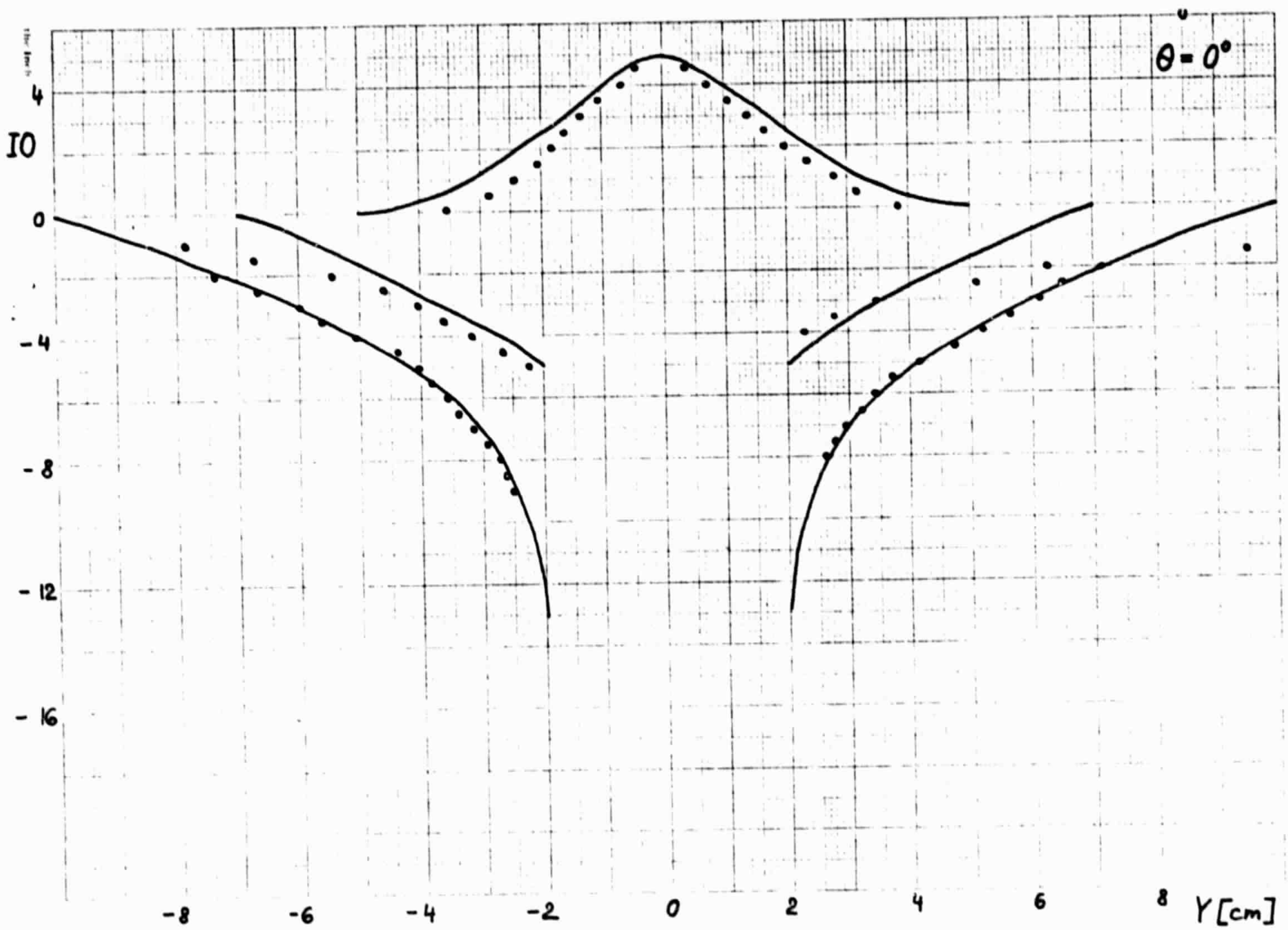

Figure 12a

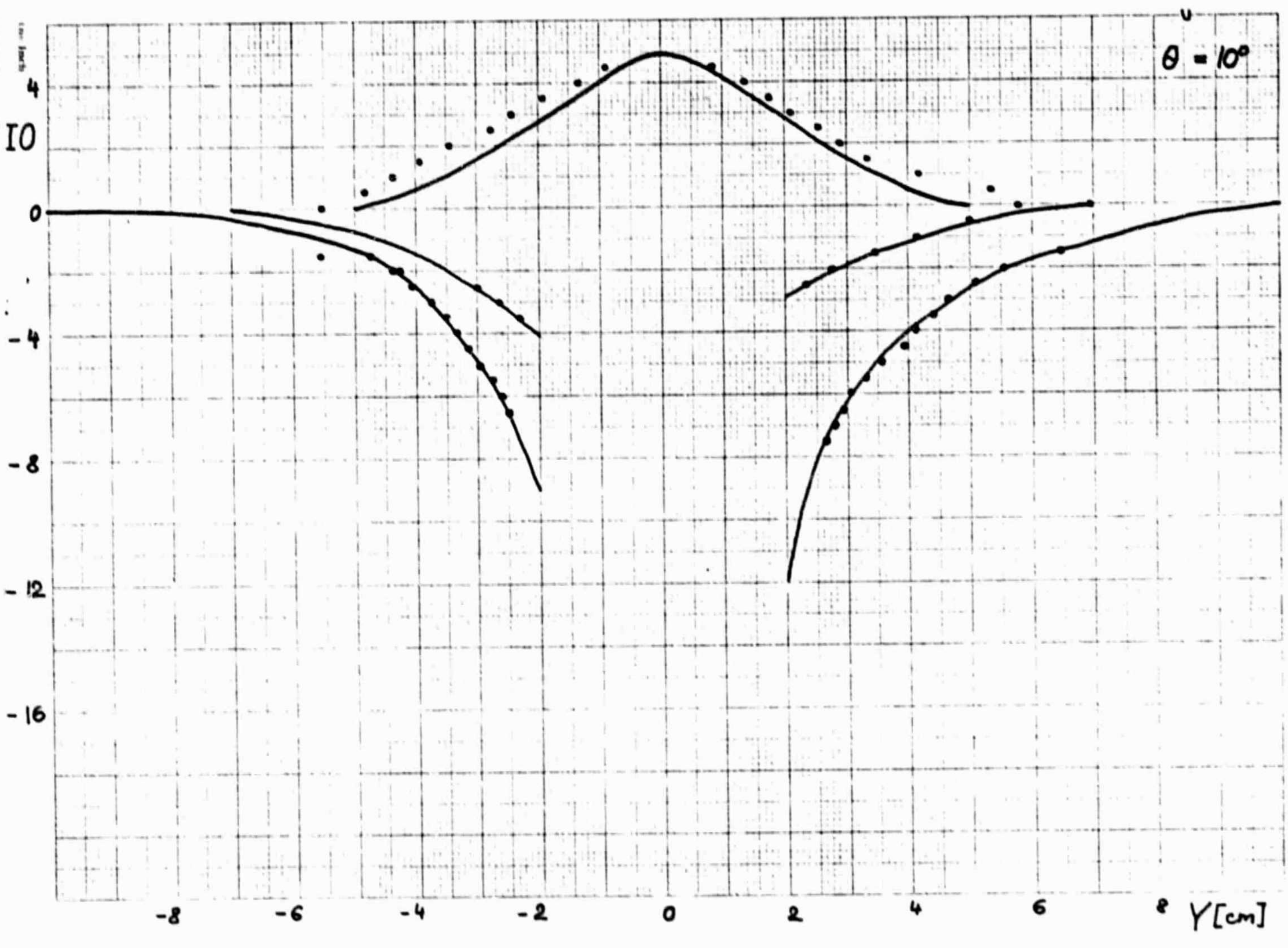

Figure 12b

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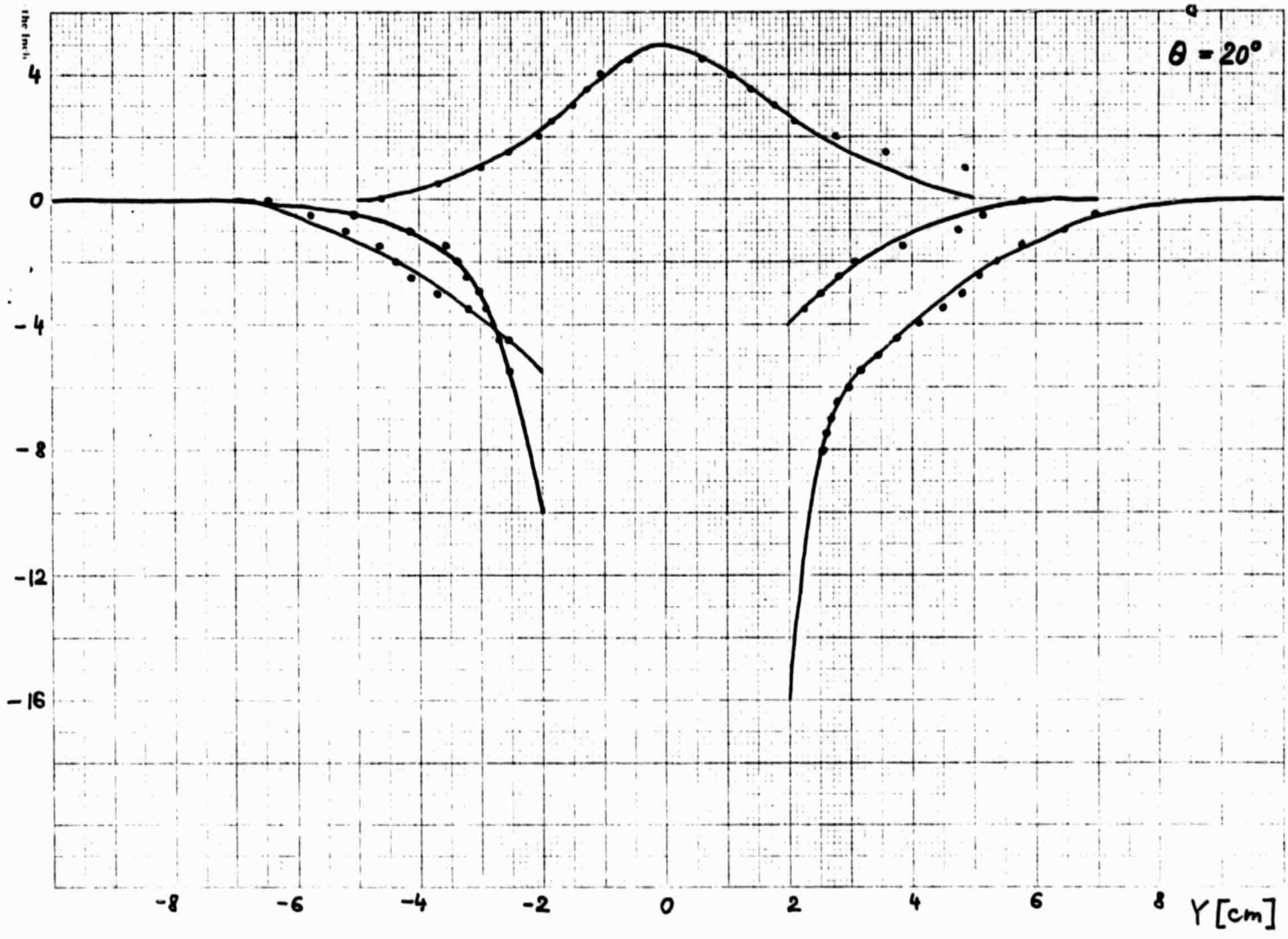

Figure 12c

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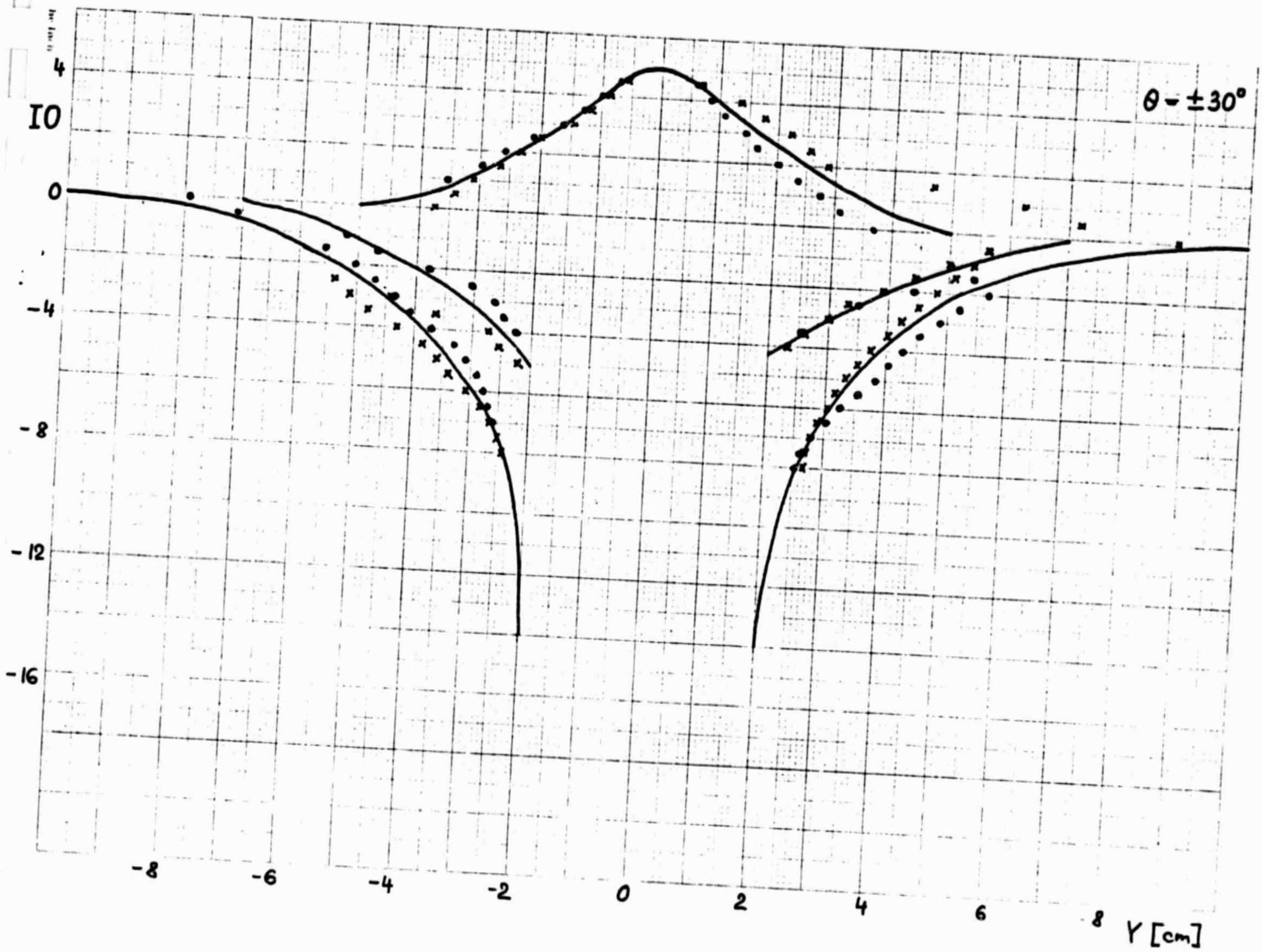

Figure 12d

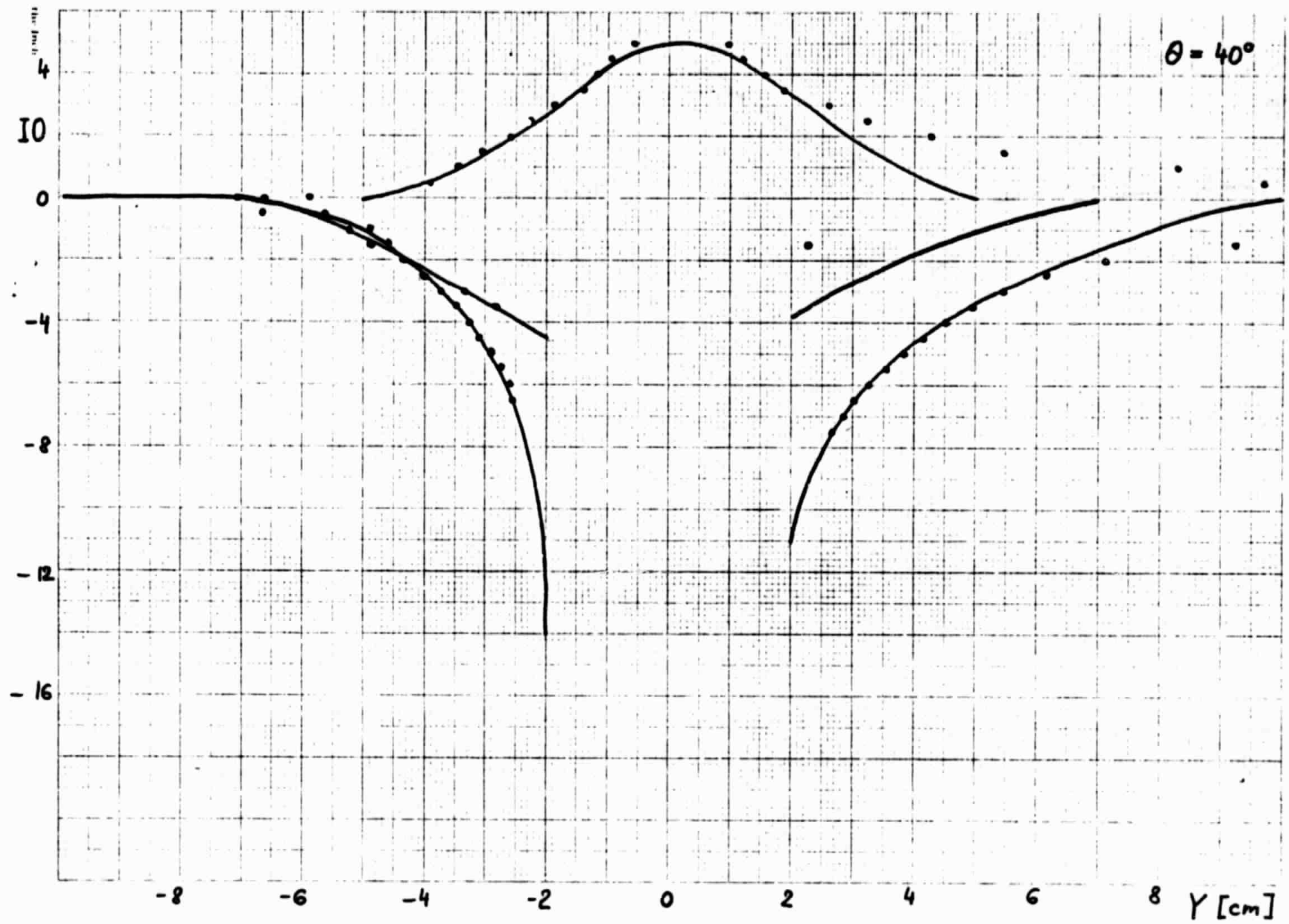

Figure 12e

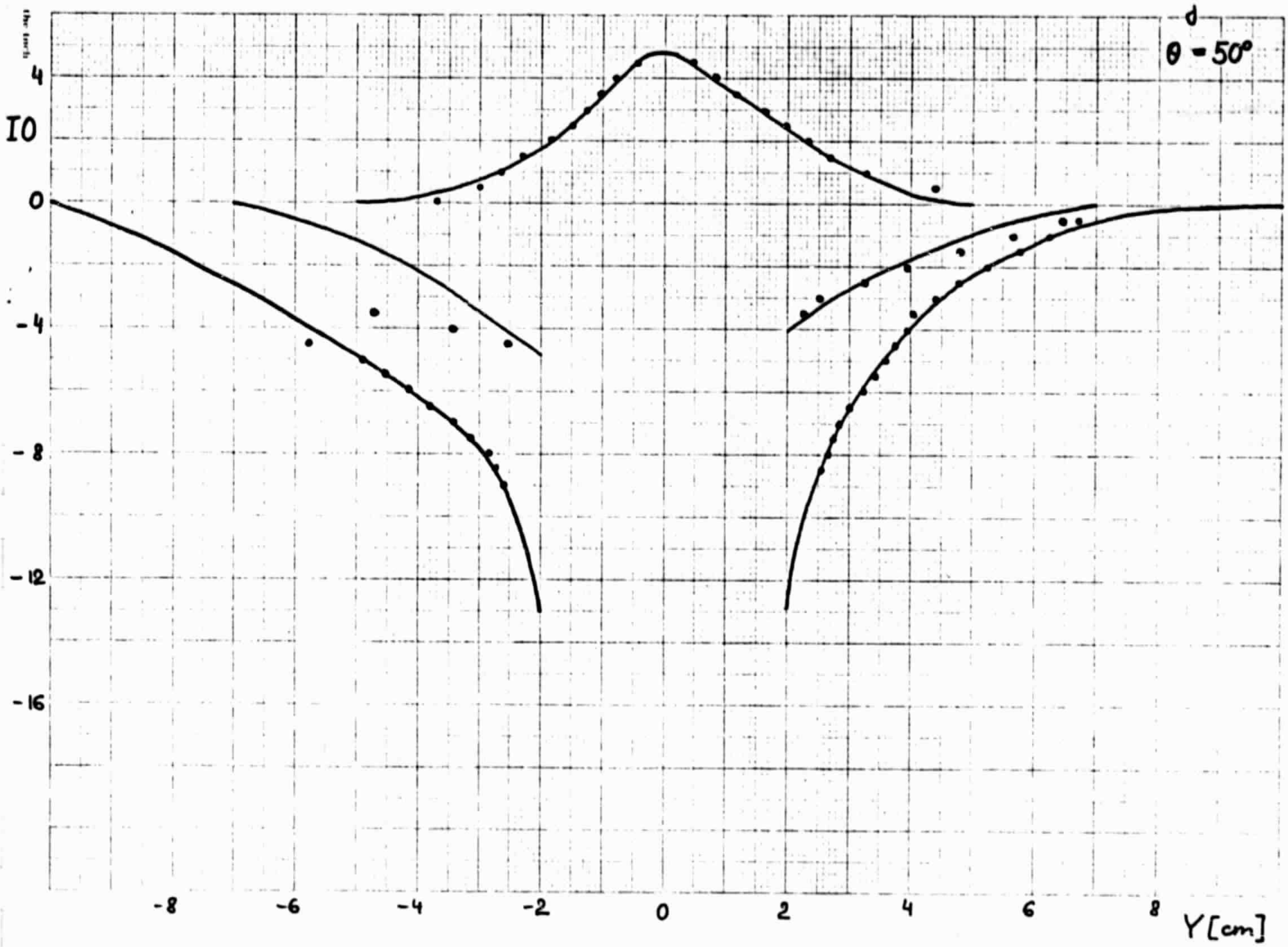

Figure 12f

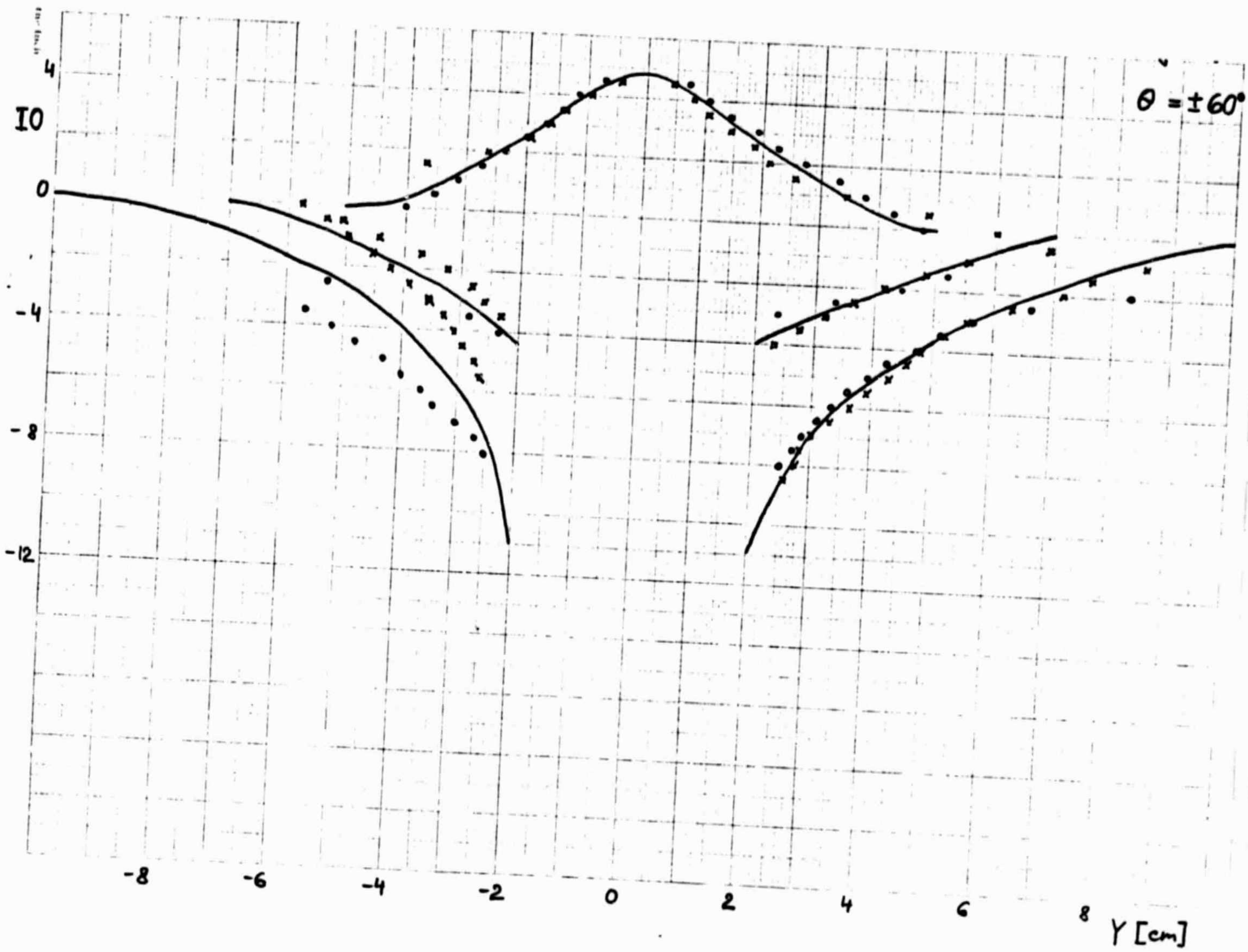

Figure 12g

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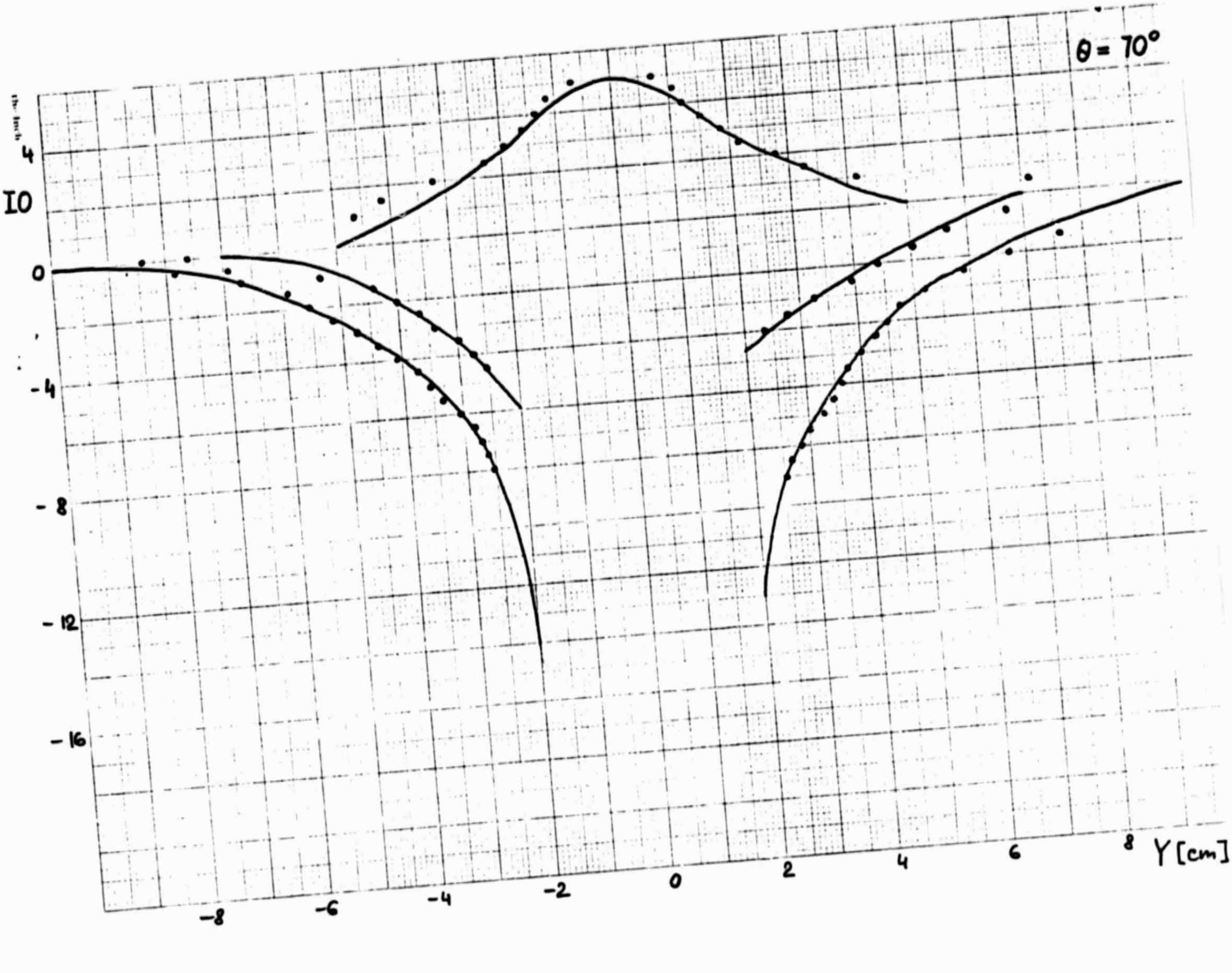

Figure 12h

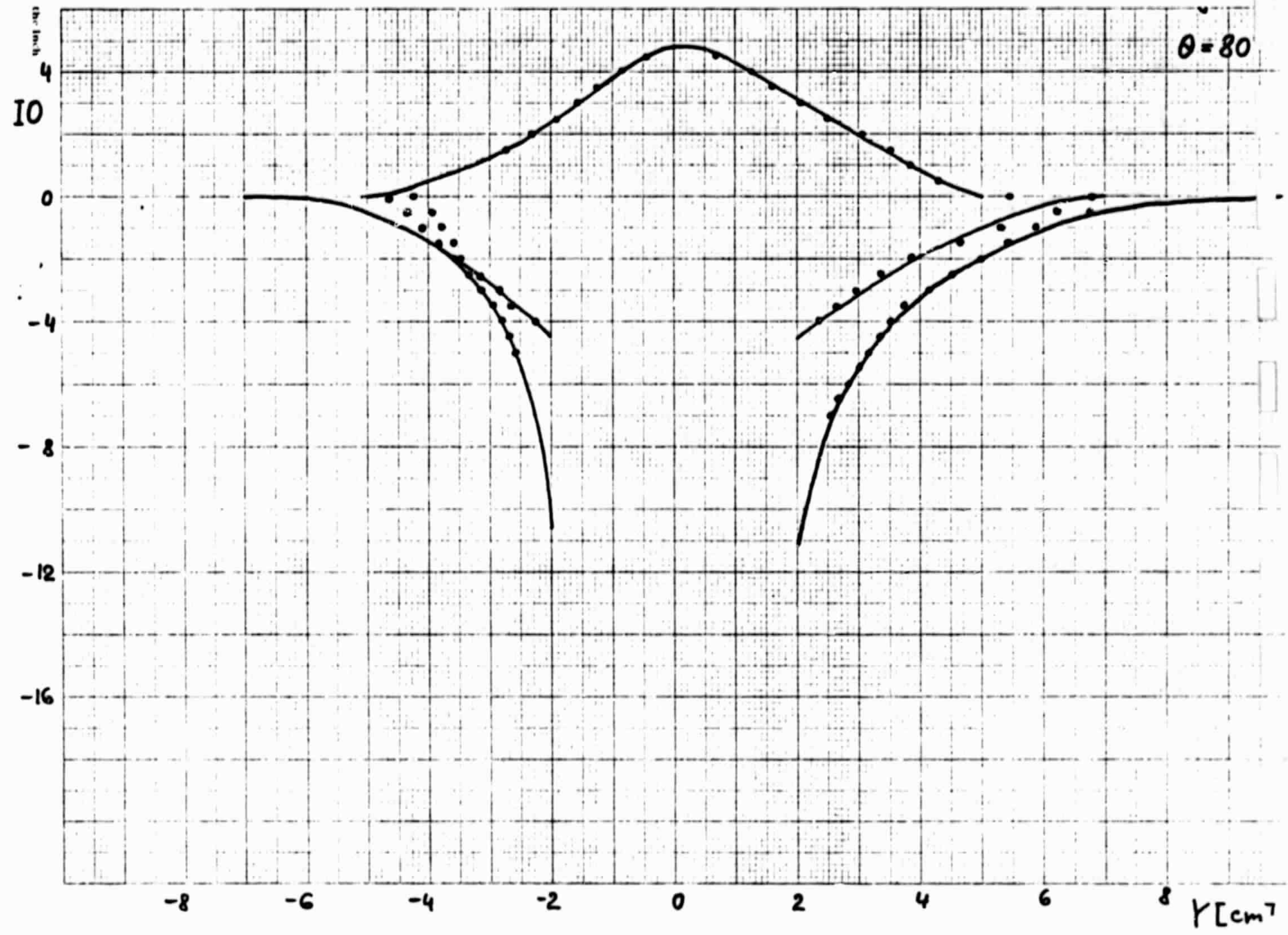

Figure 12i

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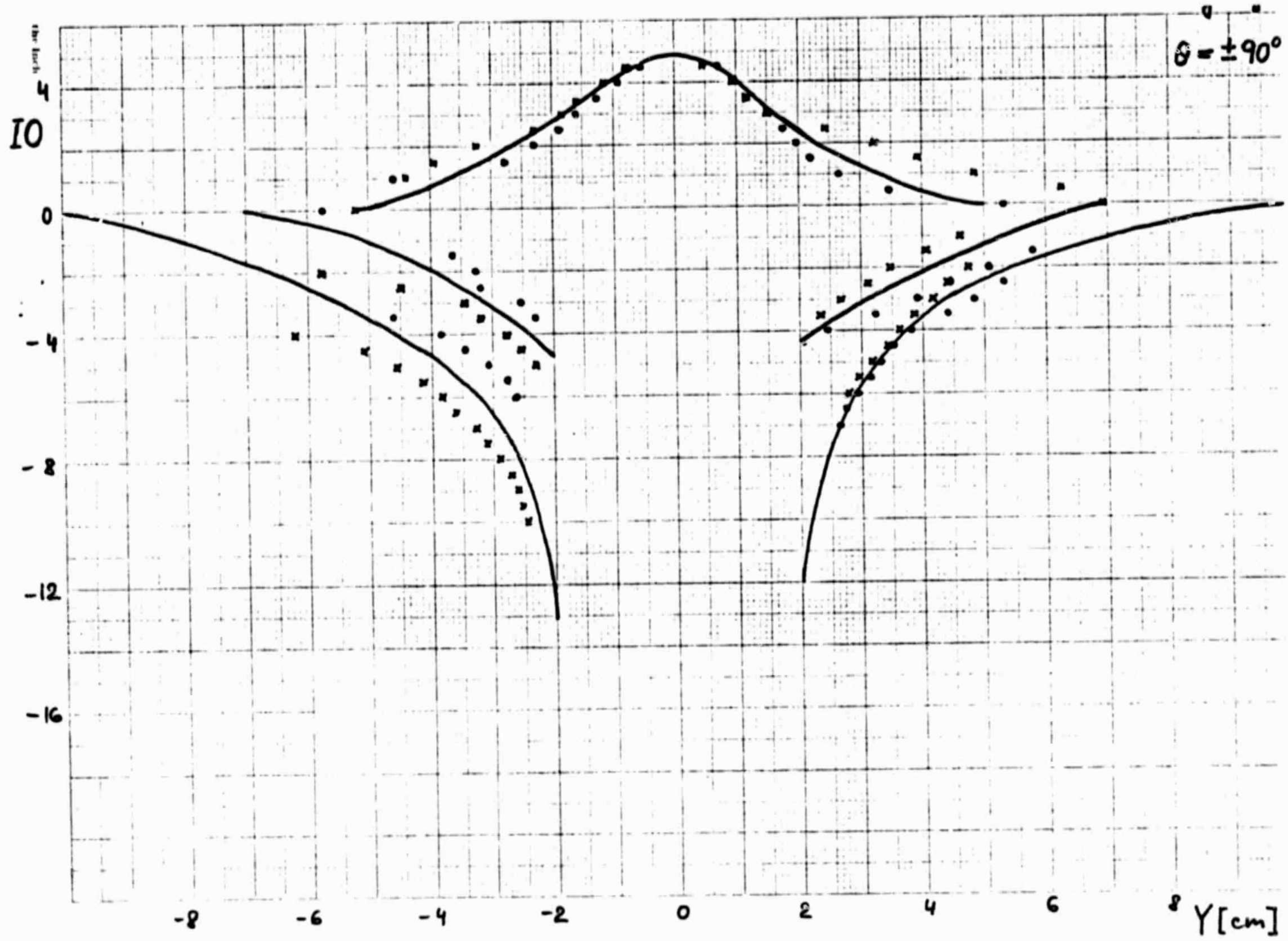


Figure 12j

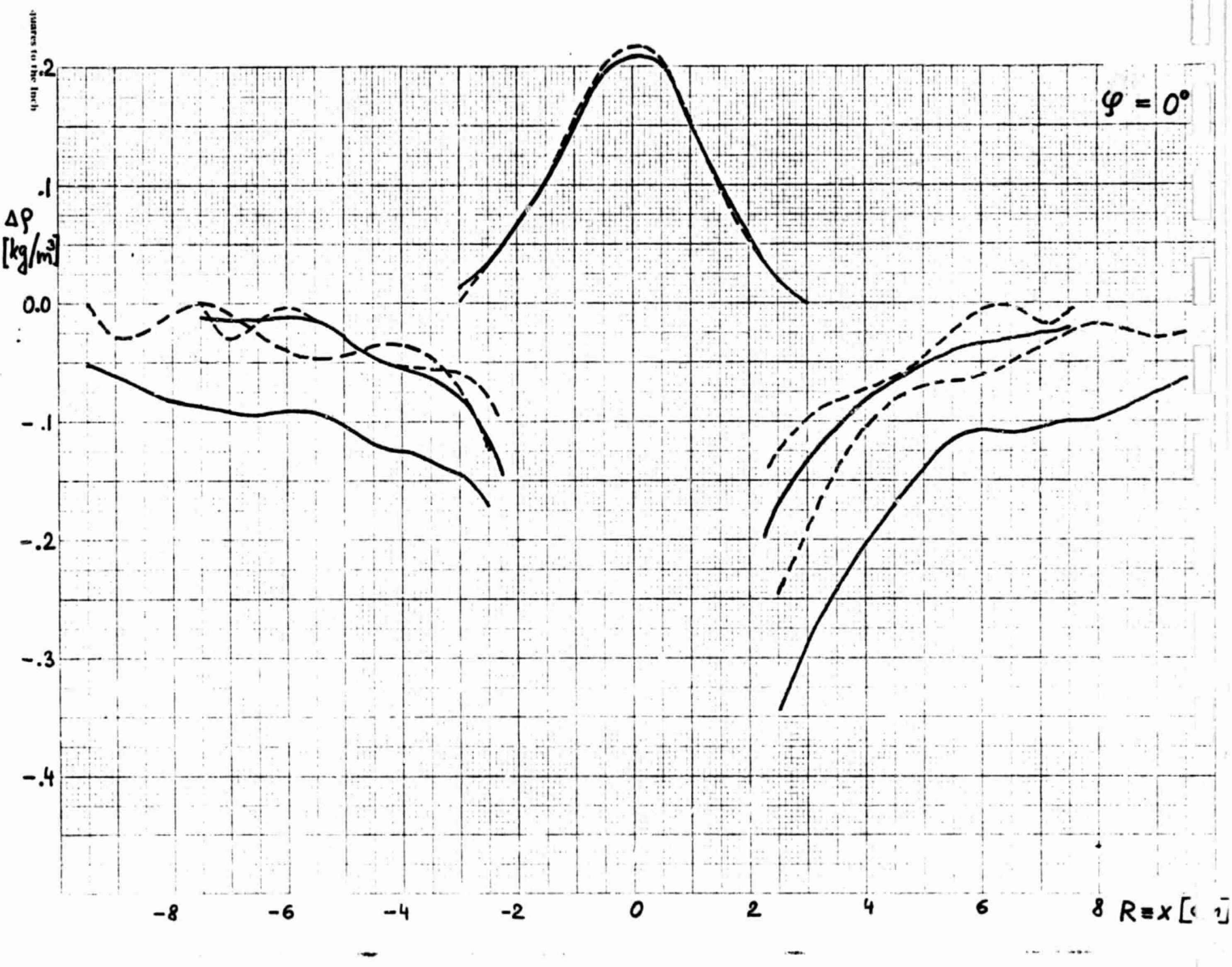


Figure 13a

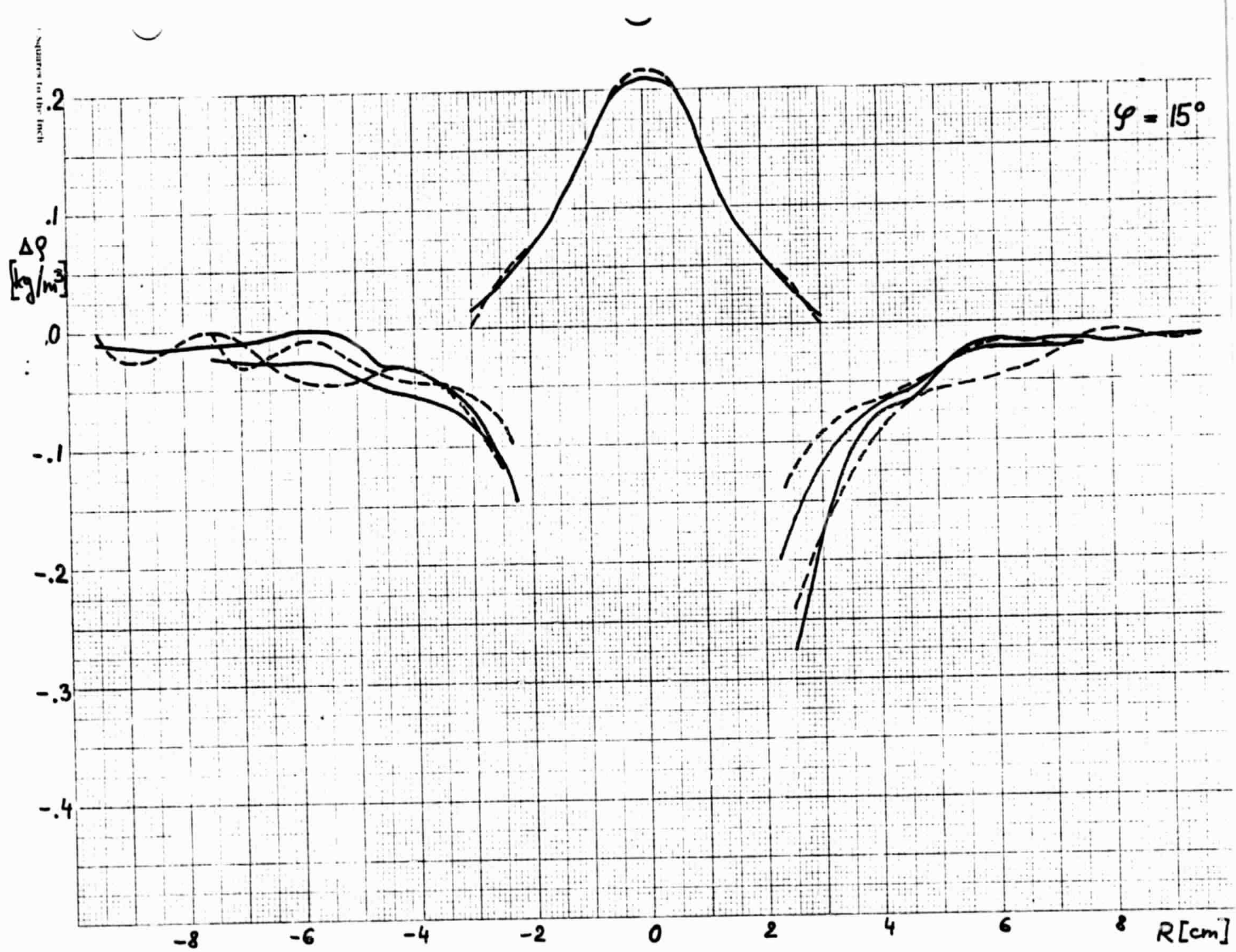


Figure 13b

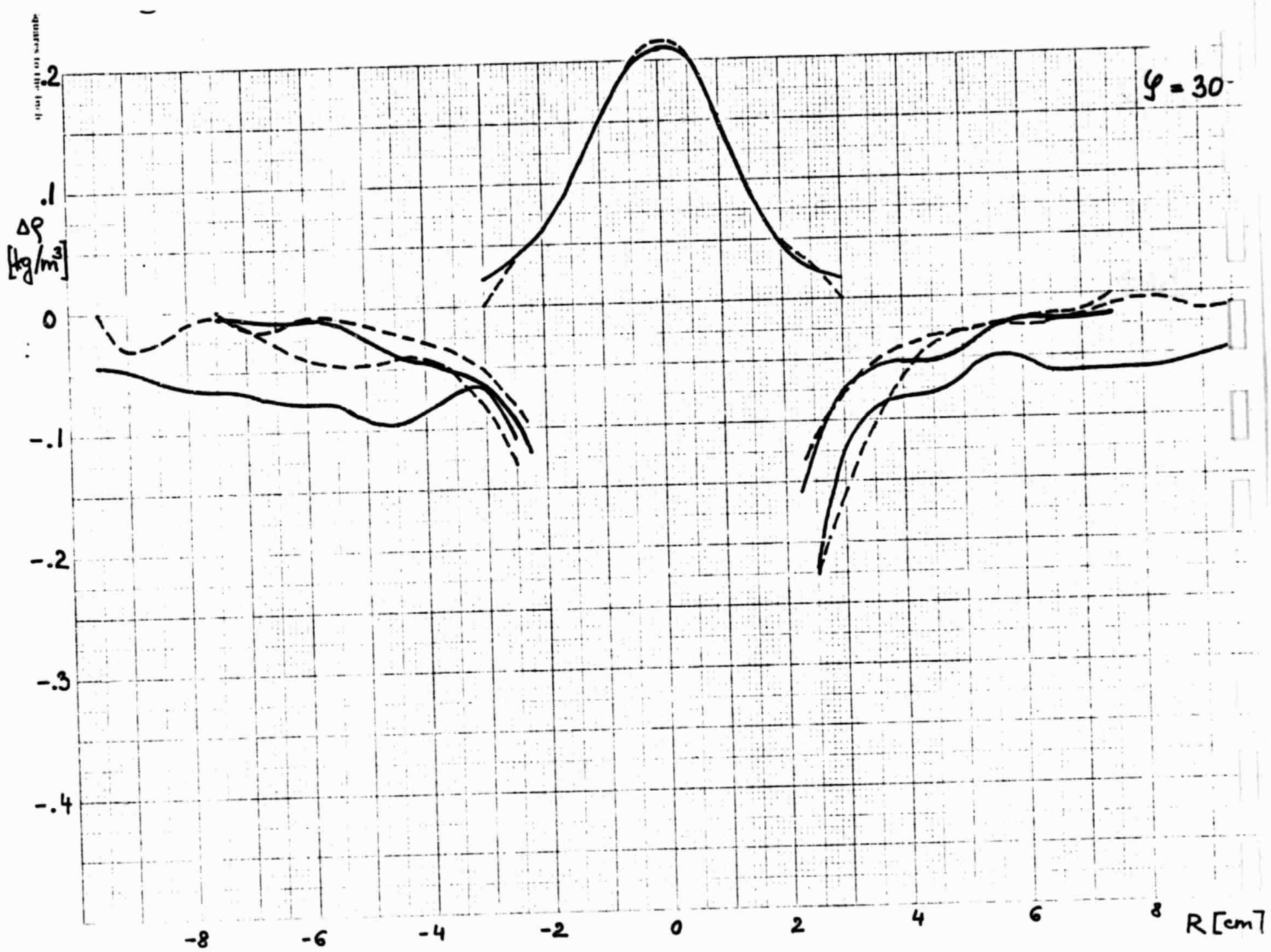


Figure 13c

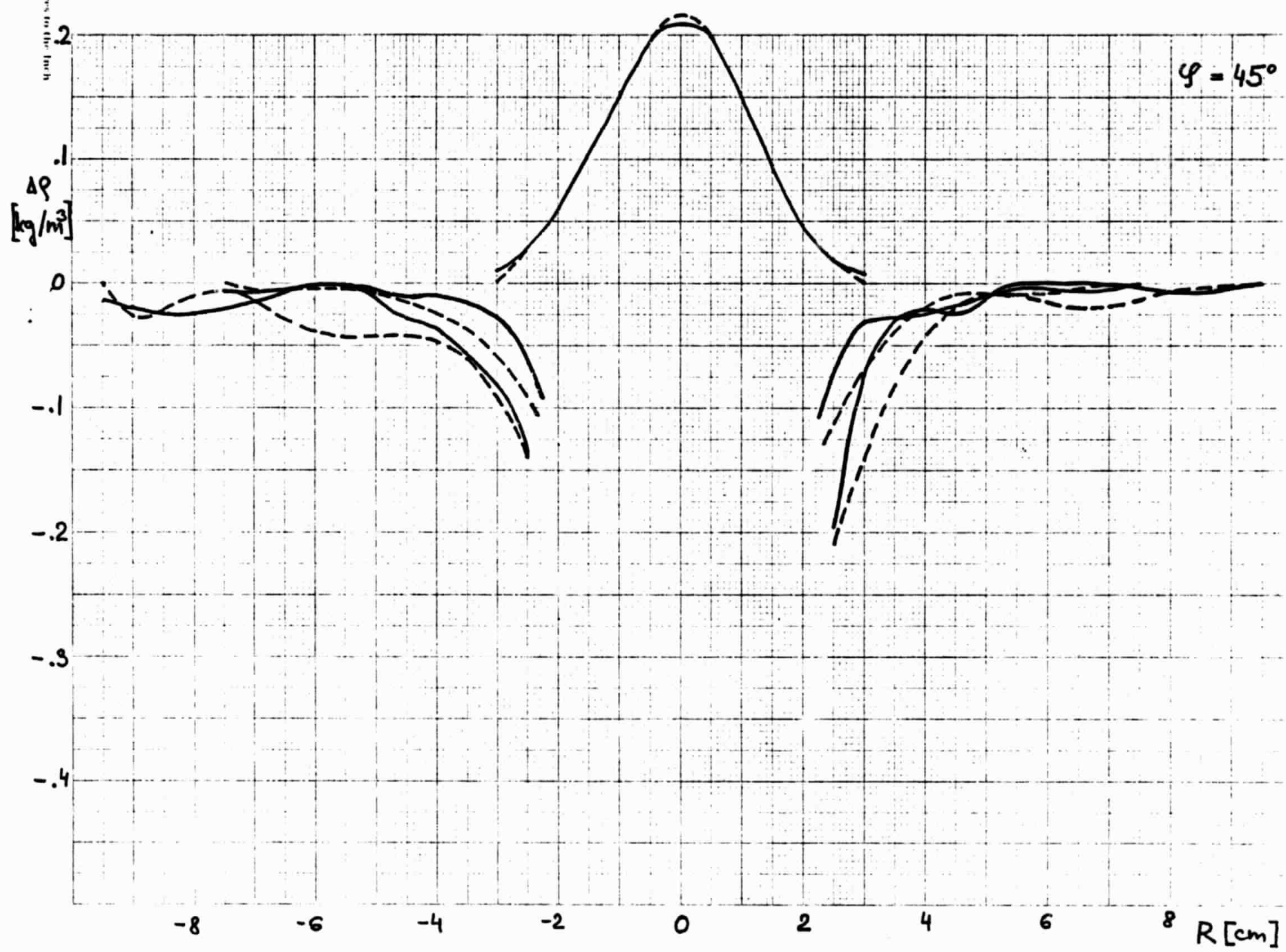


Figure 13d

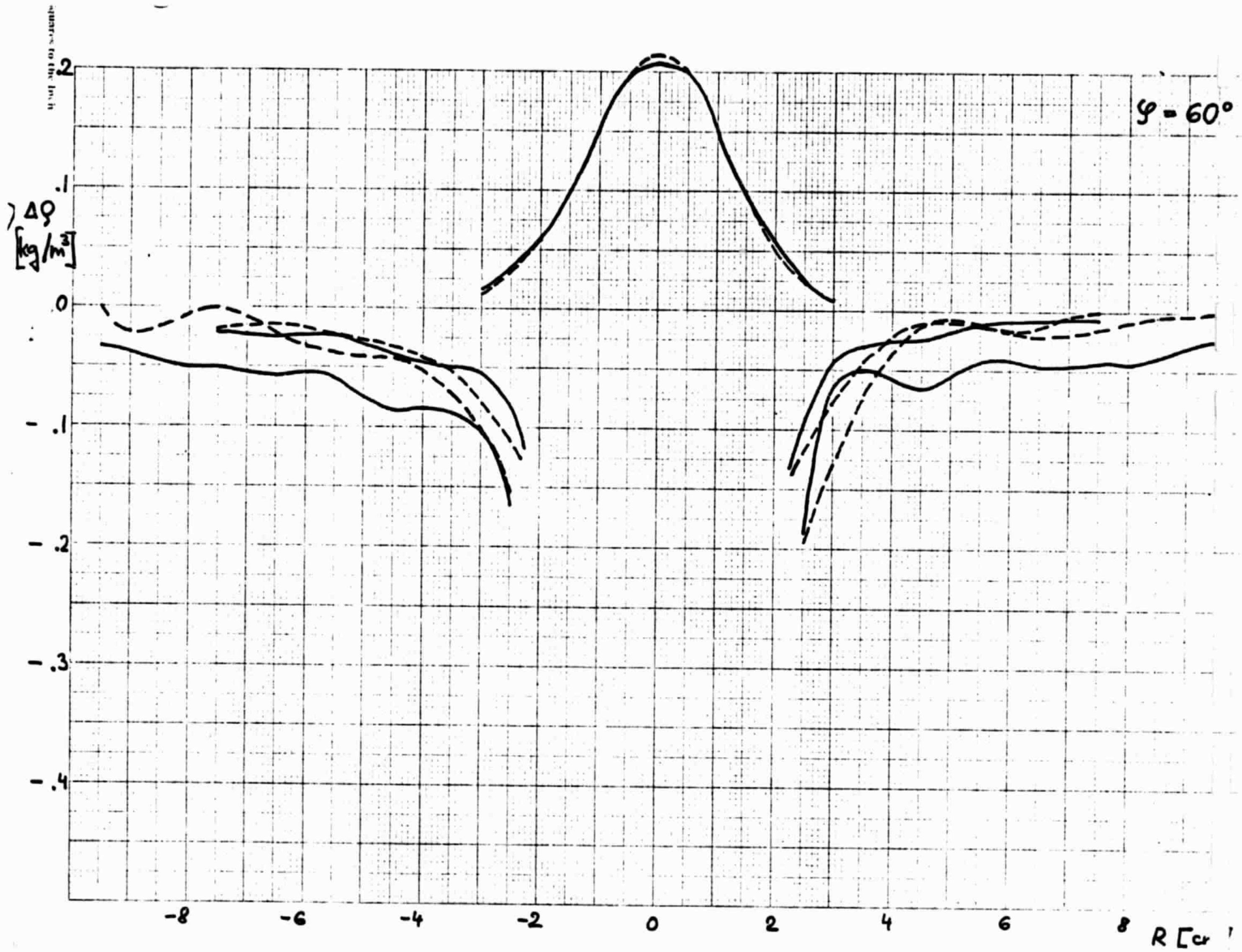


Figure 13e

Figure 13f

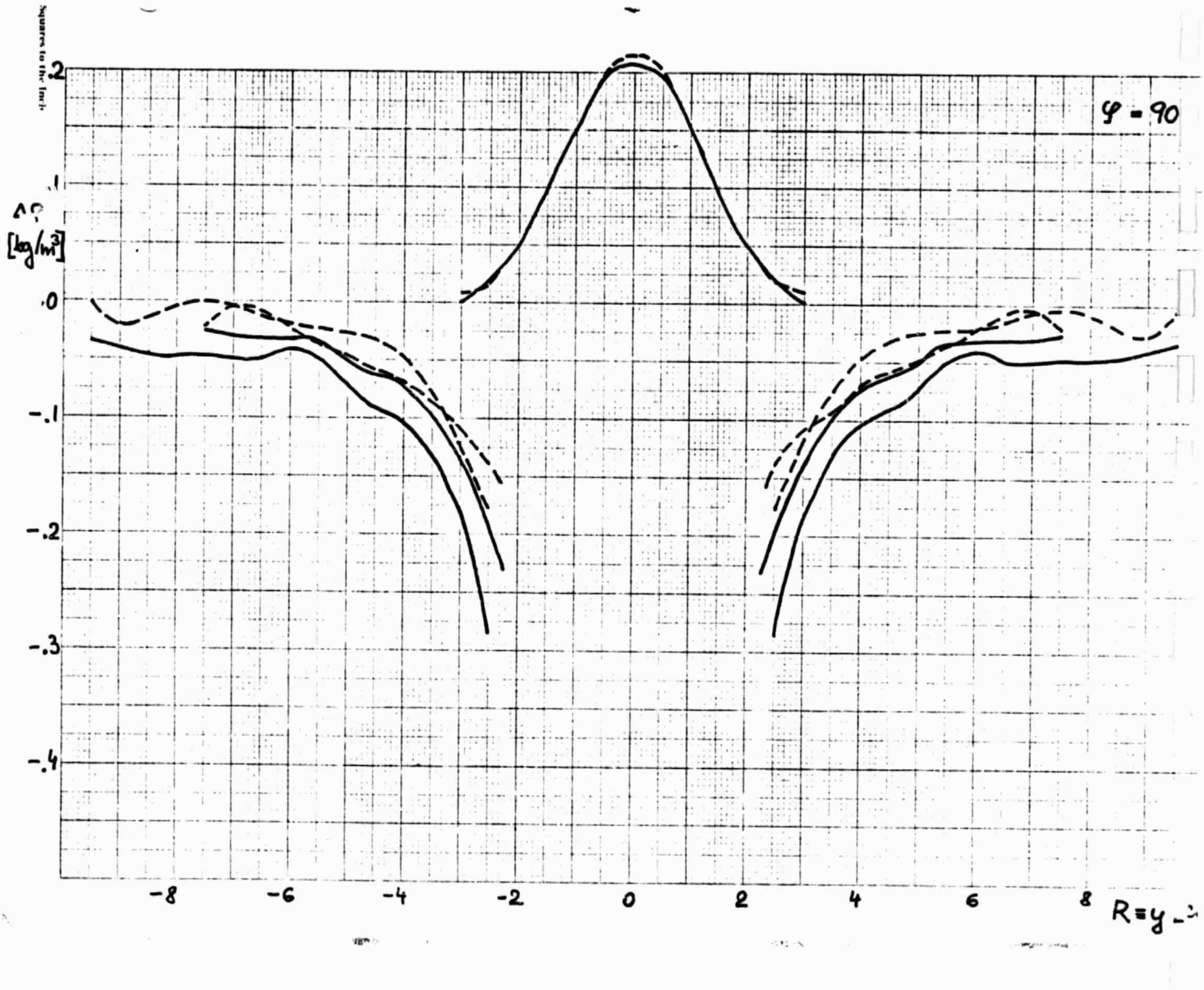

Squares to the Inch
.2
.1
.0
-.1
-.2
-.3
-.4
$\Delta\rho$
[kg/m^3]
φ = 90
-8
-6
-4
-2
0
2
4
6
8
R=y

Figure 13g

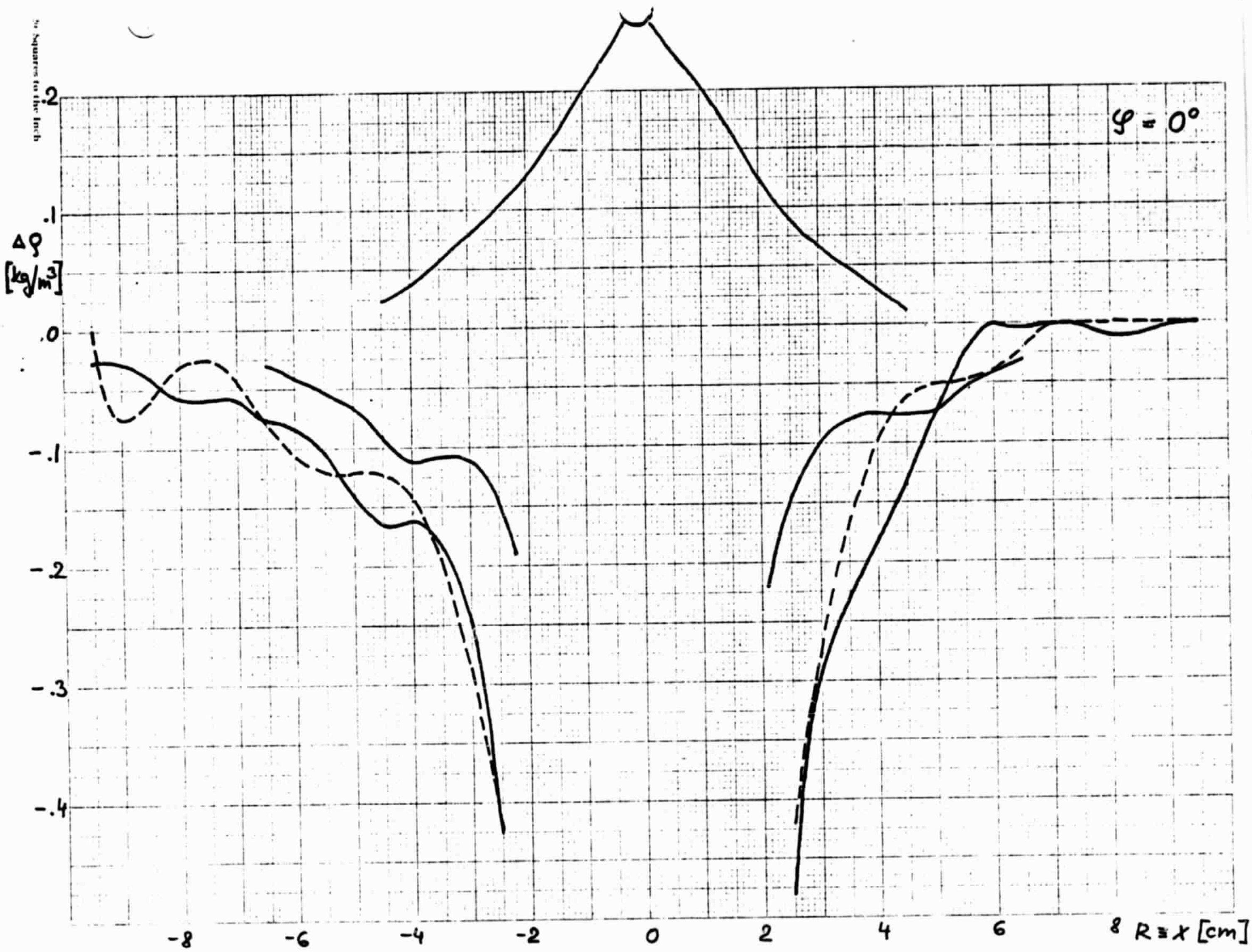


Figure 14a

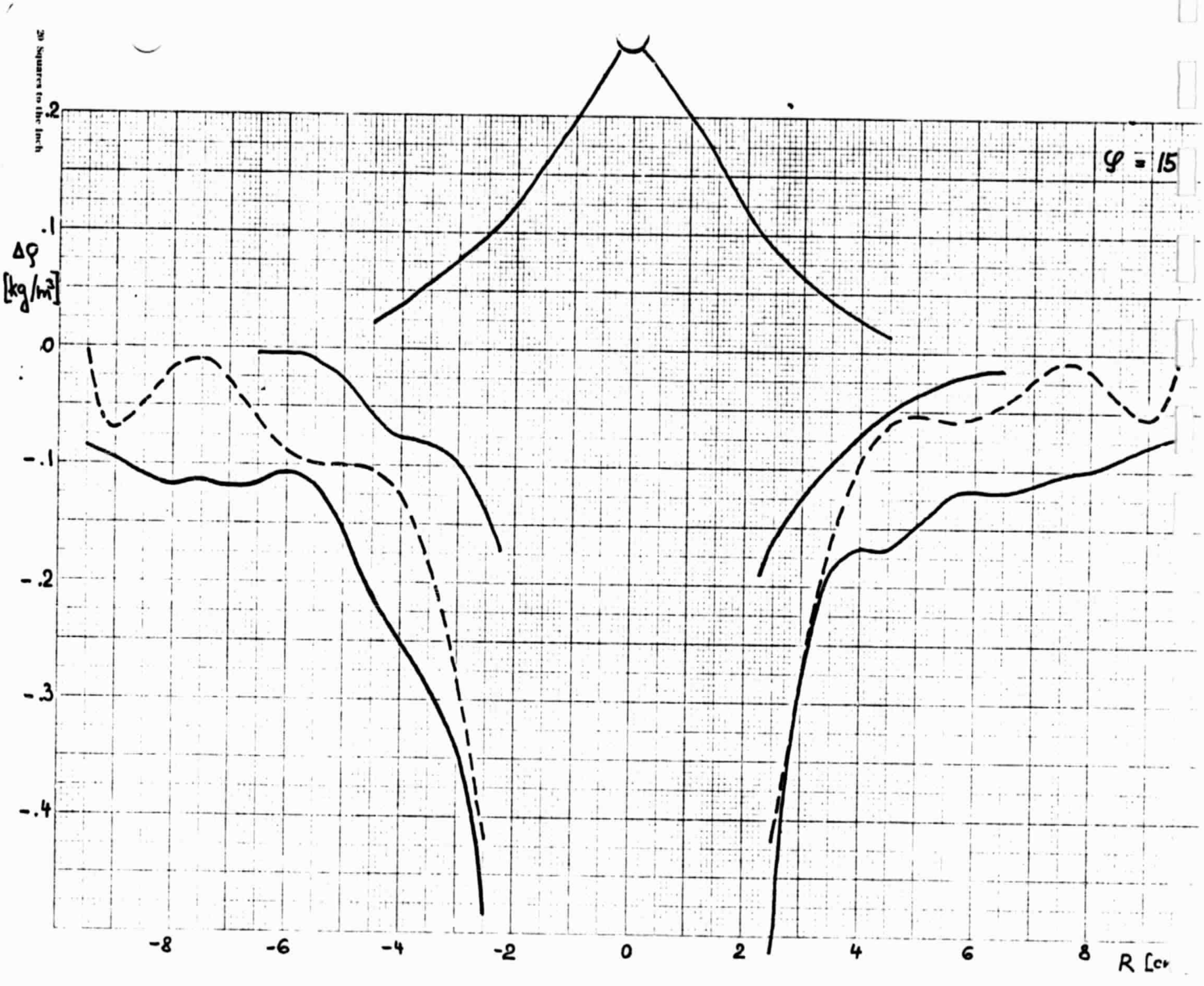


Figure 14b

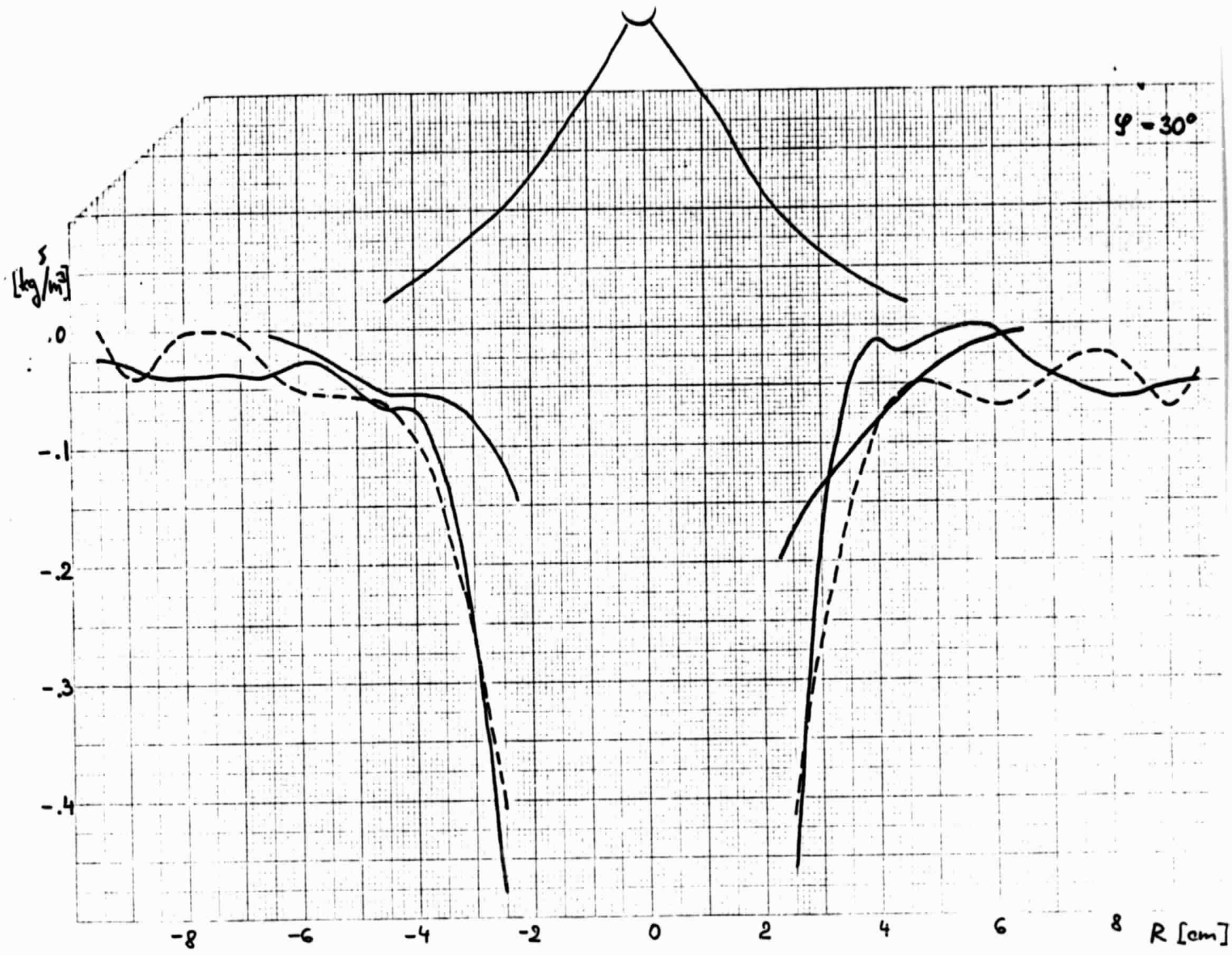


Figure 14c

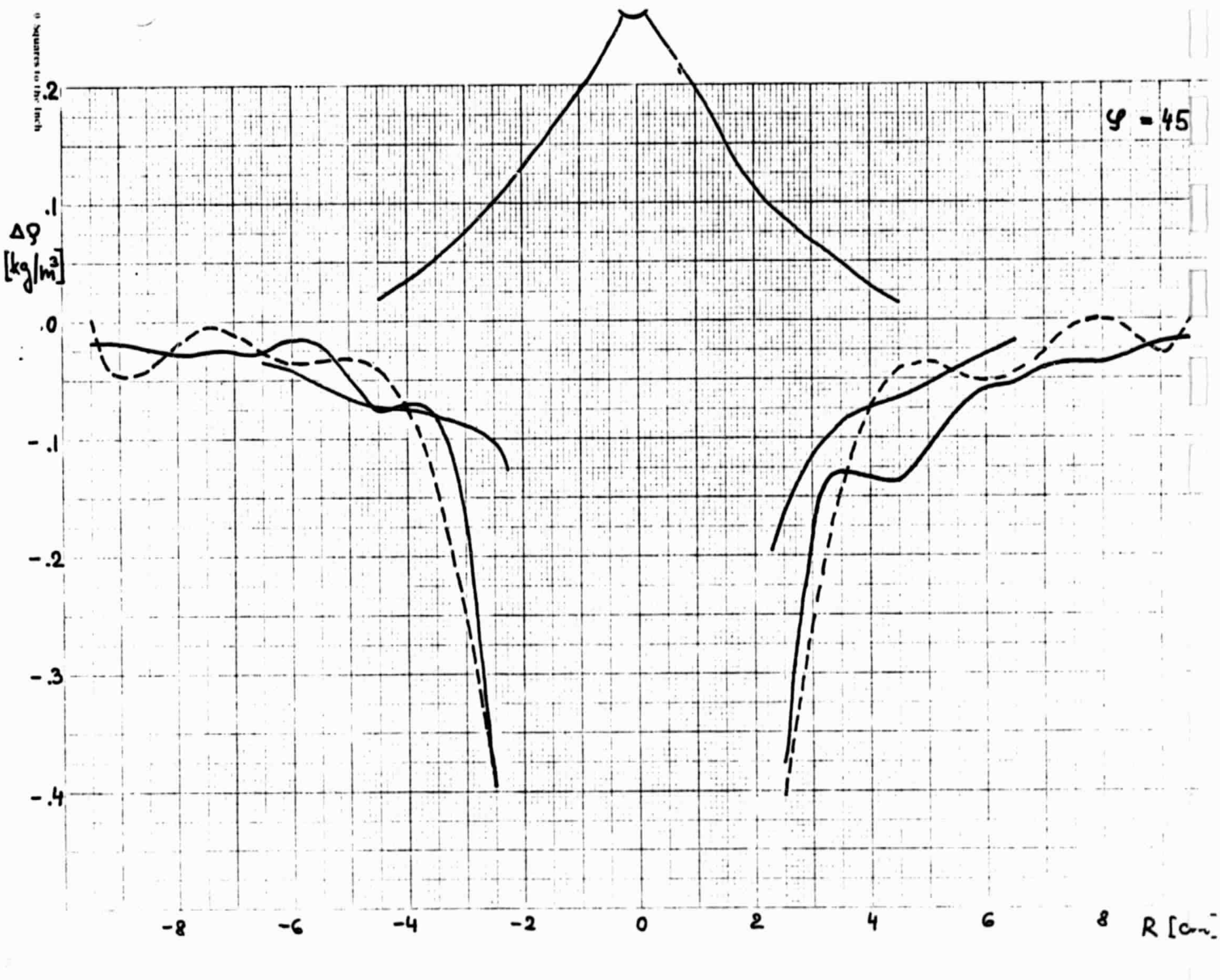
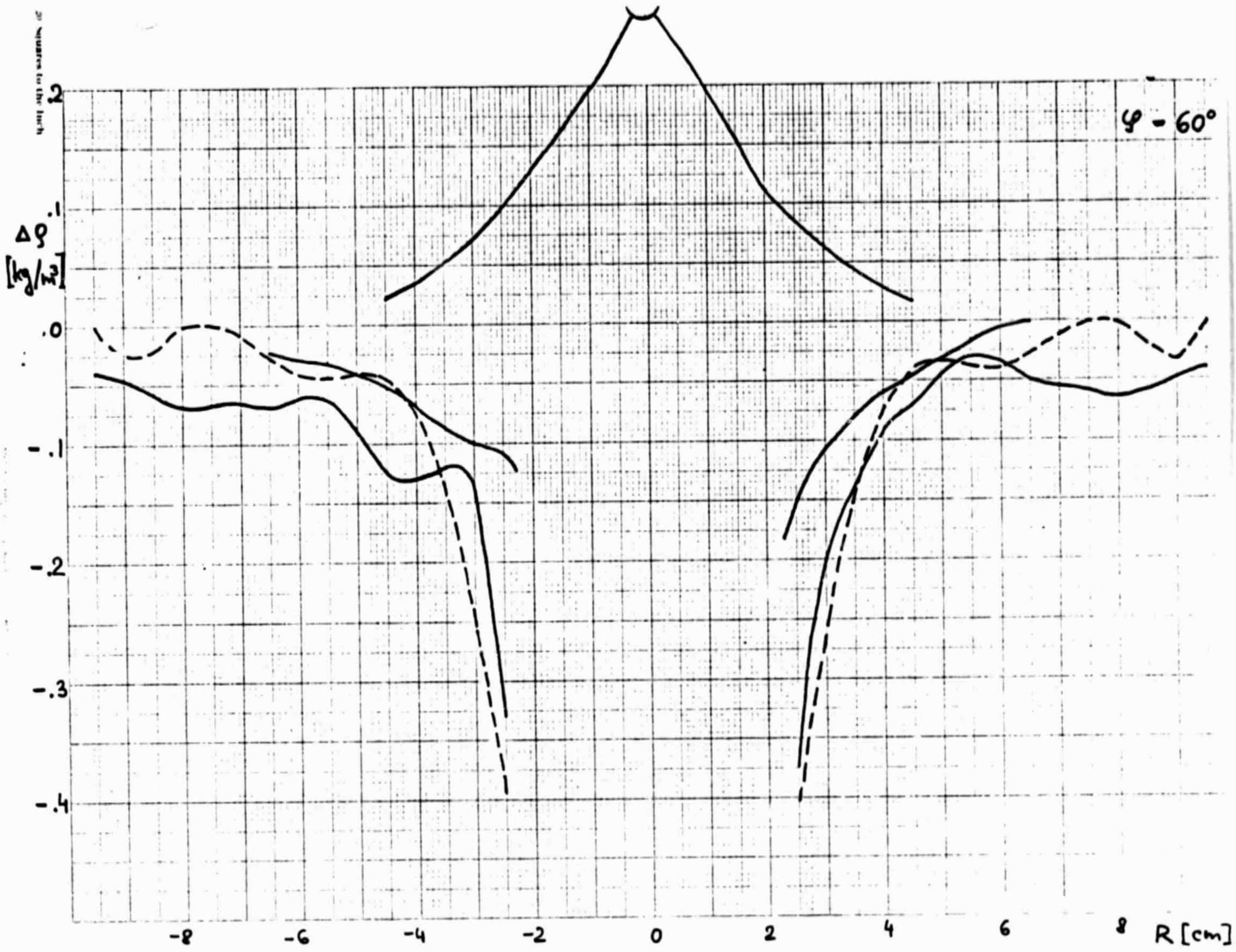


Figure 14d



20 squares to the inch
.2
.1
$\Delta\rho$
[kg/m³]
.0
-.1
-.2
-.3
-.4
φ - 60°
-8
-6
-4
-2
0
2
4
6
8
R [cm]

Figure 14e

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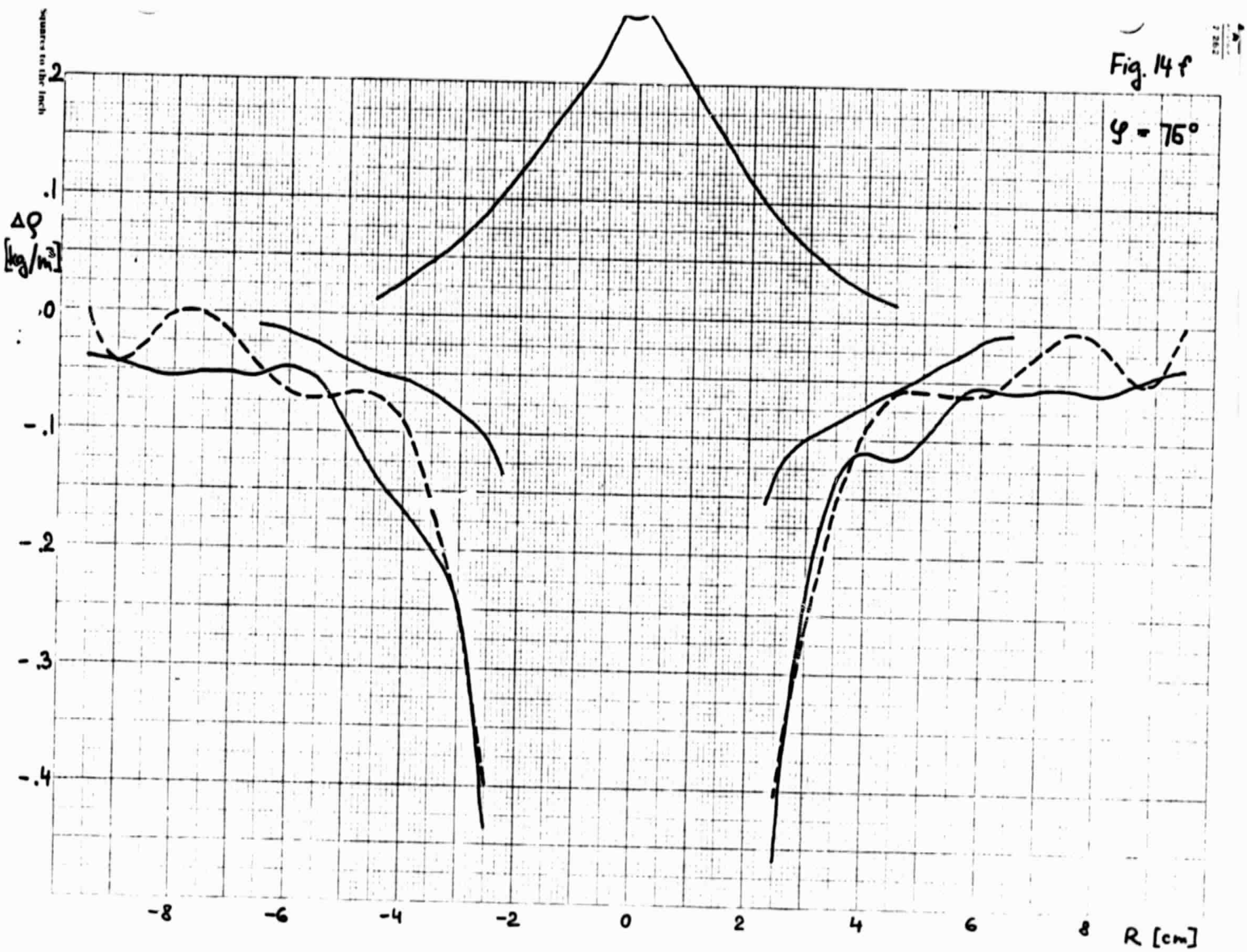

Figure 14f

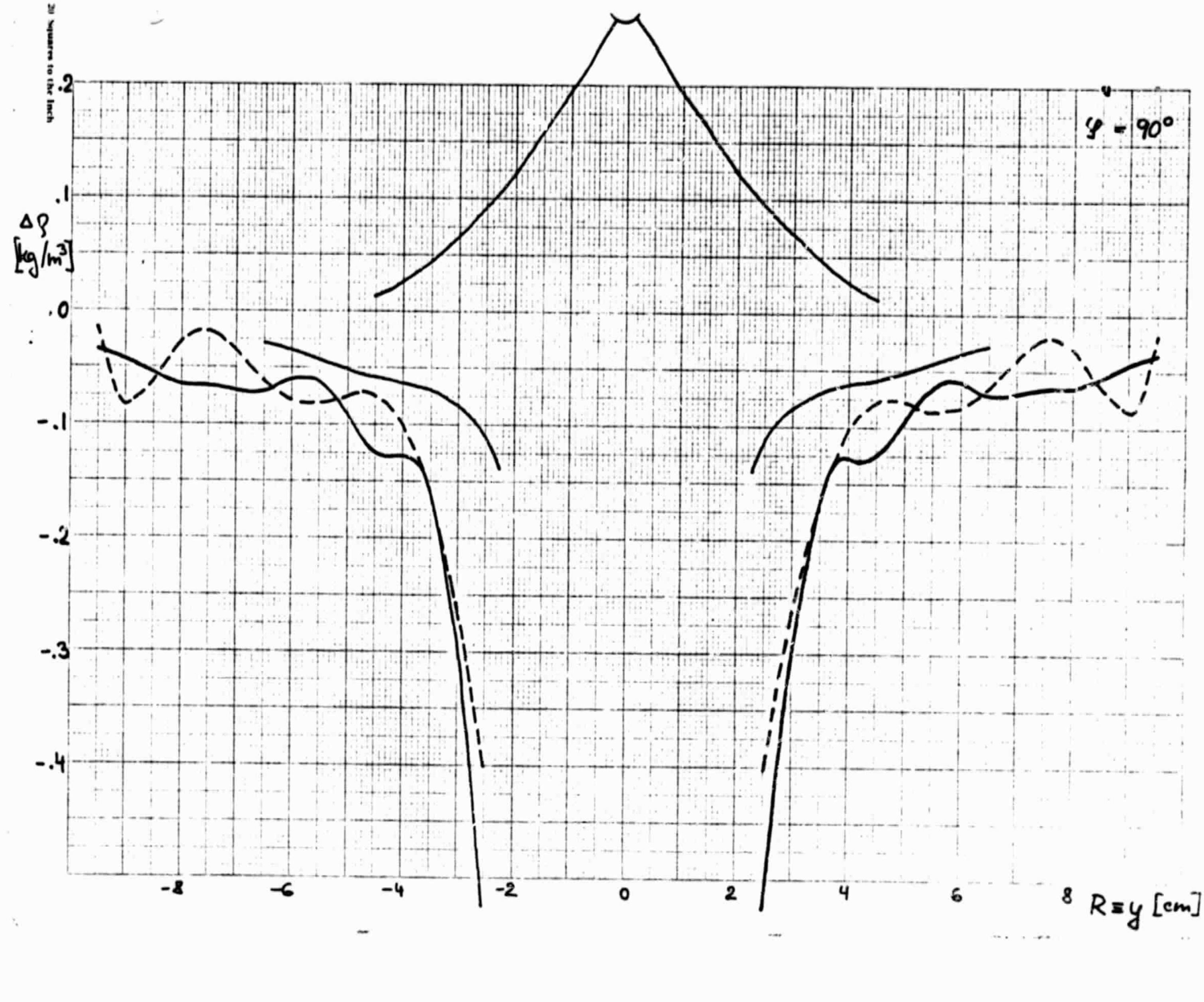

Figure 14g

object field in the cross-section $z = 0$ and $M = 0.8$.) The printed input data and the printed results are in the Appendix pages A39 to A 106. Each reconstruction is presented two times. One presentation is with the option MPLOT > 0 and the other for the option MPLOT < 0. (See Sec. 5.2.) The former alternative gives a map of the reconstructed density change $\Delta\rho(x,y) = \rho(x,y) - \rho_o$ in the investigated cross-section. The latter option tabulates the reconstructed density difference $\Delta\rho(R,\theta) = \rho(R,\theta) - \rho_o$ in polar coordinates with angular step $\Delta\theta = 5°$. In both cases the constant ρ_o equals the density in the free stream. For better illustration the sets of plots in two series of Figs. 13a to 13g and 14a to 14g show the graphical presentation of these results for the Mach numbers $M = 0.6$ and $M = 0.8$, respectively. Figures designated by letters a, b, c, d, e, f and g are plots $\Delta\rho$ vs. R for $\phi = 0°, 15°, 30°, 45°, 60°, 75°$ and $90°$, respectively. Only the solid lines have been reconstructed by the ICM. The broken lines are reconstructions from the same projection data by a series expansion method which will be discussed later in Sec. 10. The three solid curves correspond the planes $z = 0$, 1.27 and 2.54cm.

8. Program SEEX

In table 2 of Sec. 4 reconstructions obtained by the iterative convolution method (ICM) were compared with reconstructions, based on the same data, obtained by application of a series expansion method described in ref. 5. In this method the unknown object field is represented by a series of Legendre polynomials in the radial direction and by trigonometric

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functions in the azimuthal direction. A new computer code suitable for analysis of the type of incomplete data considered in this report was written.

The source code for SEEX is included in the appendix of this report. It is written in FORTRAN IV. A version for the LSI 11/23 microcomputer was not prepared because storage requirements are too great. The coordinate system, object function and projection functions are defined the same way for SEEX as for ICOM. (See Sec. 5 and Eqs. (50) and (51).)

8.1 Input

The designation of the input device is 5. The input consists of seven records.

The first record is an arbitrary text of up to 120 characters; the first character must be a blank.

The second record is read using a NAMELIST specification statement called NAM and contains the values of the following eleven variables: D, WL, GDC, MSGNV, EPSL, NN, N', M', MPLOT, NET and NET2. Except for EPSL, NN, N' and M' all these variables have the same meaning as in the program ICOM which is described in Sec. 5.1.

The real value EPSL specifies a relative tolerance for determination of the rank of the matrix of the subroutine DLLSQ. In the main program this subroutine solves the system of linear equation of a least squares method[16].

The integer NN equals the number of available projections. Generally, these projections are arbitrarily distributed. The

maximum permissible value of NN is 36.

The integers N and M respectively define the numbers of the Legendre polynomials and the number of harmonics used to approximate the projection function. The maximum permitted value of N or M is 12.

The third record consists of NN angular values of the individual projections in degrees. Note that the angle is subtended by a ray of a projection and the x axis in the object domain, i.e. by the projection plane and y axis. This angle is always measured counterclockwise from the x or y axis to the ray or the projection plane, respectively. The values of are real numbers which can be arranged arbitrarily. However, their order defines the order of the individual projections. All subsequent records must be consistent with this order.

The fourth record consists of NN integers defining the total number of the sampling points in each individual projection. They have to be ordered in agreement with the order of the individual projections defined in the third record. The maximum number of the sampling points in one projection is 25. The Ø points on the circle of radius r_o which defines the object domain may have to be among the sampling points.

The fifth record consists of 2(NN) real numbers equal to the linear coordinates Y of the boundary of the blocked region in the individual projections. Two of these values $Y = Y_{B(2k-1)}$ $Y_{B(2k)}$, k = 1, 2...NN belong to each projection. The individual couples of these values have to be ordered in agreement with the order of the individual projections in the third and fourth records. For each projection the smaller value

Y_B has to be put first. Therefore, if the opaque object overlaps the origin of the coordinate system x,y the first boundary value Y_B is always negative and the second one is positive. If no opaque object is embedded then the fifth record consists of 2(NN) zero values.

The sixth record contains the coordinates Y (real numbers) of the sampling points in the individual projections. The order of these coordinates in the individual projections can be arbitrary but the order of the groups of these coordinates belonging to the individual projections must be the same as that of the individual projections in the previous records. The number of the coordinates in each group is defined and must be equal to the corresponding integer of the fourth record.

The seventh record has the same number of real values as the sixth record. These are the values of the projection function expressed as orders of interference fringes. They must be arranged in exactly the same way as the corresponding coordinates of the sixth record. The seventh record is optional. When WL of the second record equals zero there is no need for the seventh record.

8.2 Output

The designation of the output device is 6. The output of program SEEX is organized like the output of program ICOM. There are only the following changes between these two outputs:

1) The printed title is now:

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

2) There is no interpolation coefficient IC in the program SEEX; therefore no information about it is printed.

3) After the optional printing of the Gladstone-Dale constant the following is printed:

TOLERANCE PARAMETER: EPSL

NUMBER OF PROJECTIONS: NN

TOTAL NUMBER OF SAMPLING POINTS: $\sum_{1}^{NN} I_k$ (where I_k are integers of the third input record)

ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES: N' M'

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE, RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS (PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES) only for WL $\neq$ Ø

$\vdots$

$k \quad \theta_k \quad I_k \quad Y_{B(2k-1)} \quad Y_{B(2k)}$

$(2Y_{1k}/D) \quad (2Y_{2k}/D) \ldots (2Y_{I_k k}/D)$ (normalized coordinates of the sampling points of k-th projection)

$(\hat{f}(Y_{1k},\theta_k) \quad \hat{f}(Y_{2k},\theta_k) \ldots \hat{f}(Y_{I_k k},\theta_k))$ only for WL $\neq$ Ø

$\vdots$

this is repeated for all k = 1,2,3...NN

4) Then the same print as in the program ICOM starting at the optional row

NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE ERRORS IN PERCENTS: is used. (See Sec. 5.2.)

The examples of different outputs as well as inputs can be found in the Appendix pp. A35 to A38 and A107 to A154.

9. The Reconstruction of Test Fields by SEEX

The program SEEX was used to reconstruct test object fields NO1b, NO1d and NO2 in combinations with opaque obstacles C3, C6, TS and TB. In order to compare the results of the series expansion with those of the ICM a similar sampling point distribution of the projection function (data) was used for both cases even though the series expansion method requires neither uniform spacing nor as large a number of projections as the ICM.

When one uses the program SEEX three parameters in addition to those used in the ICM program must be specified. They are EPSL, N' and M'. Each is defined in Sec. 8.1. In all cases reported here, EPSL = 10^{-4}. The parameters N' and M', define the number of Legendre polynomials and harmonics in the series representation of the projection function. One series of computations was made with N'= M' = 6 and the other with N' = M' = 12. Table 4 presents the maximum and average errors of the SEEXM (series expansion method) for all computed reconstructions. The investigated test function (TOF), opaque obstacle (OB) and the number of sampling point M along each diameter over the projection function (data) are indicated in the first three columns of Table 4. The fourth and fifth columns present the maximum and average reconstruction errors for N' = M' = 6 and N' = M' = 12, respectively. The last column is identical with the fourth column of the Table 2 and is repeated only for more convenient comparison of the

results of the SEEXM and those of the ICM.

For $N' = M' = 12$ the SEEXM provides us with nearly zero average as well as maximum error in some cases, however, in other cases this method completey fails, yielding a 100% maximum error and an average error of 15%. For $N' = M' = 6$ the results of the SEEXM were worse or roughly the same as those of the ICM. From this very limited investigation we can only conclude that:

1) For a small number of approximating Fourier harmonics and Legendre polynomials the error of the reconstruction is not as strongly dependent on the structure of the object field as in the case of higher values of N' and M'.

2) For lower N' and M' the SEEXM provides reconstruction which at best are as good as those using the ICM.

3) The chance that the SEEXM with a higher N' and M' will give better results than the ICM is good if the investigated object function is a simple function only with one maximum or minimum and if the area occupied by an opaque obstacle is smaller than 50% of the object region.

Finally, we note that it would be interesting to investigate how the reconstruction error is affected by an unequal distribution of sampling pointsof the projection function (data).

10. The Reconstruction of Data from Aerodynamic Experiments by SEEX

The program SEEX was used to reconstruct aerodynamic density fields from NASA-supplied interferograms in the same manner as described in Sec. 7 for the ICOM. Reconstructions were computed in the three cross-sections $z = 0$, 1.27 and 2.54cm for flows at

TABLE 4
Comparison of the Maximum and Average Percent Errors of the SEEXM and the ICM

TOF	OB	M	N'=M'=6	N'=M'=12	ICM
NO1b	C3	21	8.7	0.05	1.5
			1.8	0.01	0.2
	C6	21	5.0	100.0	5.7
			1.1	19.5	0.9
	TS	20	11.5	0.08	14.4
			1.8	0.01	1.6
	TB	20	13.2	0.06	22.2
			1.5	0.01	2.4
NO1d	C3	21	7.8	0.05	6.1
			1.8	0.01	0.8
	C6	21	8.5	100.0	11.0
			1.9	15.9	1.9
	TS	20	8.8	0.07	14.9
			1.8	0.01	1.8
	TB	20	9.1	0.06	19.2
			1.9	0.01	2.4
NO2	C3	27	47.5	25.1	19.5
			10.7	6.1	1.8
	C6	27	60.0	100.0	27.5
			11.0	16.9	3.7
	TS	20	43.2	52.4	16.1
			10.8	8.8	2.9
	TB	20	50.1	54.9	22.6
			10.5	8.4	3.8

both M = 0.6 and M = 0.8. The aerodynamic test object was set at a 5.5° angle of attack. (See Sec. 7.)

Input data for SEEX have been defined in exactly the same way as for the reconstructions of the ICM. This means that the same interpolations and extrapolations of the measured data and the same sampling points were used for input data for the program SEEX as for the programs INTEP or ICOM. The parameter EPSL was given the value 10^{-4} and the number N' of Legendre polynomials and number M' of Fourier harmonics was 12 in all the computed cases. The output specifications were the same as for the reconstructions by the ICM. Each reconstruction was computed with the optional output given by MPLOT > 0 as well as for MPLOT 0. All the inputs and outputs of the program SEEX are presented in the Appendix pp. A107 to A154.

Density distributions reconstructed using the series expansion method are presented graphically in Figs. 13 and 14 for Mach numbers M = 0.6 and M = 0.8, respectively. The dashed lines are used to display the reconstructed density change $\Delta\rho(R, \phi)$. No results reconstructed by the SEEXM are presented for the cross-sections z = 0 and 1.27cm at Mach number M = 0.8. For these two cases the SEEXM completely failed. The reconstructed density difference was nearly zero throughout the region.

The following summarizes a comparison of the reconstructions by the series expansion method (SEEXM) and the iterative convolution method (ICM):

1) The reconstructions from complete projection data at the tangential plane z = 0 are essentially identical by the two methods.

2) The discrepancy between results of the two methods at other cross-sections is greater than one would expect in view of the accuracy found with analytical test fields.

3) The fields reconstructed by the ICM fluctuate more with the angular variable than those reconstructed by the SEEXM.

4) For fluctuations along the radial coordinate R the converse is true.

The difference in results obtained by the two methods was substantially greater than would be expected on the basis of reconstruction of analytical test fields. This is probably because the real data were noisier and less consistent than the simulated data. The interferometric data from the experiment were smoothed in the radial direction by visual interpolation, but were not smoothed in the azimuthal direction. This led to a reconstructed density distribution which was too corrugated azimuthally when the iterative convolution method was used. The series expansion method resulted in more smoothing in this direction. Although the SEEXM results in smoothing of the projection functions through solving an overdetermined system of equations by a least squares method, false fluctuations of the field occur in the nodial direction due to non-optimal selections of N' and M'.

Finally, and perhaps most importantly, we note that the interferograms used in this study were not of sufficient quality to permit accurate reconstruction of the density distribution. Because the fringe shifts were not large, the substantial amount of background noise forced us to use far too much visual

extrapolation as well as ad hoc procedures to estimate fringe order. Improvements in experimental technique and fringe analysis will be required to obtain accurate reconstructions.

11. Conclusions

We have developed a new type of tomographic code which is intended to produce good reconstructions when a test model obscures part of the field of view when an interferogram of an aerodynamic flow field is made. The code combines the features of convolution-type algorithms with those of interative algebraic techniques. In particular, reconstruction is performed during a sequence of iterations between the object field space and the Radon transform space (projection space). This iterative scheme produces an artificial density field within a convex region which bounds the obscuring object. Everywhere outside this obscured region the projections, or Radon transform, are represented by the measured data from the experiment. The algorithm is relatively fast and storage efficient, as is desirable for handling large amounts of experimental data. Computer codes based on this algorithm have been run on a large microcomputer (LSI 11/23) as well as on a mainframe computer.

This algorithm was studied empirically by using it to reconstruct "data" which were line integrals of analytical "object fields." Reconstruction errors were determined by comparing the object fields reconstructed by the ICM with exact values. The effects of the following parameters and factors were studied in this manner:

i. M, the number of sampled projection values in each viewing direction.

ii. N, the number of views (interferograms).

iii. Technique for initializing data in the region of blocked projections.

iv. Weighting function to be used in the convolution algorithm.

v. Numerical integration method to be used for computing projections.

vi. Criterion for terminating the iterative reconstruction procedure.

The remaining parameters and factors were studied by a series of numerical experiments in which two "object fields" were reconstructed. One is a field having four local maxima, and the other is a field having one maximum located close to its boundary. Both fields were zero outside a circle of radius r_o. Four opaque objects (i.e. cross-section of aerodynamic models) were used in the study: circles of radii $r/r_o = 0.3$ and $r/r_o = 0.6$, and two triangles. Three possible techniques for initializing data (iii) were considered. Some analytical studies were used to provide guidance for selecting the ratio N/M. Criteria for termination (vi) were developed using two figures of merit: the RMS error in the reconstruction on the boundary $r = r_o$, where the object field must vanish and the RMS error in calculated projections relative to their "measured" values over the accessible domain.

The results of these studies are displayed in a sequence of 65 figures which are included in this report. Maximum reconstruction errors ranged from 1.5% to 47% in these tests and

average reconstruction errors ranged from 0.2% to 5.3%, depending on the complexity of the field, size of the opaque object, etc.

From this study we developed good guidelines for the selection of M and N, the best technique for initializing data in the region of blocked projections, and a fairly reliable criterion for terminating the iterative process.

For comparison, and to develop an altnerate reconstruction code applicable to analysis of interferograms with blocked regions, we wrote a program based on earlier work by Cha in this laboratory. This code implicitly fills in the missing projections by using a series expansion that meets all mathematical criteria for being a Radon transform, in particular the k th moment of the projections with respect to the radial coordinate with an azimuthal harmonic weighting function vanishes if k is less than m, in order of the harmonic weighting function.

When the object field had a simple structure and the opaque object occupied less than 50% of the object field area, the series expansion gave results comparable with, and in some cases more accurate than, the iterative convolution method. When the object field was more complicated and/or the opaque object was large, the iterative convolution method gave substantially more accurate reconstructions.

Both the iterative convolution and series expansion methods were used to reconstruct aerodynamic density fields from sequences of holographic interferograms of the flow about a cylindrical test object with a hemispherical nose. The test

object had an angle of attack of 5.5° in an airflow at Mach numbers M = 0.6 and M = 0.8. The interferograms were recorded with viewing directions every 10° over a 180° range. It appeared that the iterative convolution method gave better reconstructions. The series-expansion reconstructions tended to be overly corrugated in the radial directions in cross-sectional planes that included the test object. The iterative convolution reconstructions tended to be corrugated in the nodial direction.

It should be noted that the interferograms contained so much extraneous fringe structure (experimental measurement error) that rather ad hoc procedures had to be used to assign fringe orders, and visual extrapolation had to be used to provide much of the data for the computer codes. Improvement in experimental techniques and/or fringe processing will be required if accurate tomographic reconstructions are to be made.

Finally, some simple experiments were conducted to show that data can be obtained by a holographic technique in which interferograms are formed using laser light diffusely reflected by the opaque test object. This work was reported separately [17,18]. This technique potentially could be used to provide the equivalent of a full set of data for tomographic reconstruction even though an opaque test object is present. Development of this method would require further study of the behavior of tomography algorithms when the field includes a region of zero density change bounded by a discontinuity.

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APPENDIX

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```
C      PROGRAM INTEP.NO2 (I.E. THE PROGRAM INTEP WITH THE TEST FUNCTION
C      TF=NO2)   -   PDP-11 VERSION
C
C
C
       BLOCK DATA
       COMMON /B1/P(19,108),PF(38,55),I,MIF,MI,KH,IC,DPI,N,MSGNV,SGN
       DATA P/2052*1.5E30/,PF/2090*1.5E30/
       END
C
       IMPLICIT REAL*8 (A-H,R-Z)
       INTEGER A(108)
       COMMON /B1/P(19,108),PF(38,55),I,MIF,MI,KH,IC,DPI,N,MSGNV,SGN
       DIMENSION U(15),H(15),C(107),S(107),X(16),Y(37)
       DATA SPI/3.14159265DO/,
      1U(1),U(3),U(5),U(7),U(9),U(11),U(13),U(15)/0.201194094DO,
      20.3941513471DO,0.5709721726DO,0.7244177314DO,0.8482065834DO,
      30.9372733924DO,0.9879925180DO,0.DO/,H(1),H(3),H(5),H(7),H(9),
      4H(11),H(13),H(15)/0.1984314853DO,0.1861610001DO,0.1662692058DO,
      50.1395706779DO,0.1071592204DO,0.0703660475DO,0.0307532420DO,
      60.2025782419DO/
C READING 1 AND PRELIMINARY COMPUTATION
       READ(4,200)
  200 FORMAT('AN ARBITRARY TEXT UP TO 120 CHARACTERS  123456789 12345678
      19 123456789 123456789 123456789 123456789 123456789 123456789 ')
       READ(4,*) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
       READ(4,*) (A(I),I=1,2*N)
       DO 5 I=1,2*N
       IF(A(I).LE.O) GO TO 100
    5 CONTINUE
       DO 10 I=1,7
       U(2*I)=-U(2*I-1)
   10 H(2*I)=H(2*I-1)
       R=D/2.DO
       THETA=SPI/N
       DELTA=D/(M-1)
       DPI=SPI*2.DO
       DO 20 I=1,2*N-1
       C(I)=DCOS((I-N)*THETA)
   20 S(I)=DSIN((I-N)*THETA)
C READING 2 AND CONTROL BLOCK
       IF(WL.NE.O.DO) GO TO 42
       DO 30 K=1,N
       KY1=1
       KY2=A(2*K-1)
       DO 30 L=1,2
       DO 31 I=KY1,KY2
       Y(I)=(I-1)*DELTA-R
       XN=DABS((R-Y(I))*(R+Y(I)))
       XN=DSQRT(XN)
       SUM=O.DO
       DO 32 J=1,15
       X(J)=XN*U(J)
       XX=X(J)*C(K+N-1)-Y(I)*S(K+N-1)
       YY=X(J)*S(K+N-1)+Y(I)*C(K+N-1)
   32 SUM=SUM+TF(XX,YY)*H(J)
   31 PF(I,K)=SUM*XN
       KY1=M+1-A(2*K)
   30 KY2=M
       GO TO 40
```

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```
   42 DO 41 K=1,N
      READ(4,*) (PF(I,K),I=1,A(2*K-1))
   41 READ(4,*) (PF(I,K),I=M+1-A(2*K),M)
   40 IF(IC.LE.1) GO TO 100
      GSUM=0.D0
      DO 43 K=1,N
      DO 43 I=1,M
      IF(PF(I,K).LT.1.E30.AND.ABS(PF(I,K)).GT.DABS(GSUM)) GSUM=PF(I,K)
   43 CONTINUE
      SGN=1.D0
      IF(GSUM.LT.0.D0) SGN=-1.D0
C PROJECTION FUNCTION
      KY1=(M+1)/2
      DO 60 K=1,N
      DO 60 I=1,KY1
   60 PF(I,N+K)=PF(M-I+1,K)
      MIF=0
      DO 70 I=1,KY1
      PF(I,2*N+1)=PF(I,1)
      KH=0
      KD=0
      DO 71 K=1,2*N
      IF(PF(I,K).GT.1.E30.AND.PF(I,K+1).LT.1.E30) KH=K
      IF(PF(I,K).LT.1.E30.AND.PF(I,K+1).GT.1.E30) GO TO 80
   71 CONTINUE
      IF(KH.EQ.0.AND.KD.EQ.0.AND.PF(I,1).GT.1.E30) GO TO 70
      IF(KD.NE.0) MI=2*N+KD-KH
      IF(KH.EQ.0.AND.KD.EQ.0) MI=2*N
      IF(KH.NE.0.AND.KD.EQ.0) GO TO 70
      CALL INTP
   70 CONTINUE
      N=IC*N
      DO 90 K=1,N
      DO 90 I=1,KY1
      PF(I,K)=P(I,K)
   90 PF(M+1-I,K)=P(I,N+K)
C BOUNDARY
      DO 50 K=1,N
      PF(M+1,K)=0.
      A(2*K-1)=(M+1)/2
      A(2*K)=A(2*K-1)
      DO 50 I=1,M
      IF(PF(I,K).LT.1.E30.AND.PF(I+1,K).GT.1.E30) A(2*K-1)=I
      IF(PF(I,K).GT.1.E30.AND.PF(I+1,K).LT.1.E30) A(2*K)=M-I
   50 CONTINUE
      GO TO 100
C
C
   80 IF(KH.NE.0) GO TO 81
      KD=K
      GO TO 71
   81 MI=K-KH
      CALL INTP
      GO TO 71
C
C
  100 WRITE(5,200)
      WRITE(5,*) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
      WRITE(5,*) (A(I),I=1,2*N)
      DO 111 K=1,N
```

A3


```
      WRITE(5,*) (PF(I,K),I=1,A(2*K-1))
  111 WRITE(5,*) (PF(I,K),I=M+1-A(2*K),M)
      STOP
      END
C
C
C
      SUBROUTINE INTP
      IMPLICIT REAL*8 (A-H,R-Z)
      VIRTUAL DC(28,54),DS(28,54)
      COMMON /B1/P(19,108),PF(38,55),I,MIF,MI,KH,IC,DPI,N,MSGNV,SGN
      DIMENSION AF(28),BF(28)
C
      IF(MI.EQ.1) GO TO 30
      IF(MI.EQ.MIF) GO TO 10
      NN=MI/2
      DPM=DPI/MI
      DPN=DPM/IC
      DO 11 J=1,NN+1
      DO 11 K=1,MI
      AG=(J-1)*(K-1)*DPM
      DC(J,K)=DCOS(AG)
   11 DS(J,K)=DSIN(AG)
      MIF=MI
   10 C=2.DO/MI
      DO 20 J=1,NN+1
      AF(J)=O.DO
      BF(J)=O.DO
      IF(2*(J-1).EQ.MI) C=1.DO/MI
      DO 21 K=1,MI
      KT=KH+K
      IF(KT.GT.2*N) KT=KT-2*N
      AF(J)=AF(J)+PF(I,KT)*DC(J,K)
   21 BF(J)=BF(J)+PF(I,KT)*DS(J,K)
      AF(J)=AF(J)*C
   20 BF(J)=BF(J)*C
   30 DO 31 K=1,MI
      KT=KH+K
      IF(KT.GT.2*N) KT=KT-2*N
      KTT=IC*(KT-1)+1
      P(I,KTT)=PF(I,KT)
      IF(MI.EQ.1.OR.K.EQ.MI.AND.MI.NE.2*N) GO TO 33
      DO 31 L=1,IC-1
      SUM=AF(1)/2.DO
      AG=DPN*(IC*(K-1)+L)
      DO 32 J=2,NN+1
   32 SUM=SUM+AF(J)*DCOS((J-1)*AG)+BF(J)*DSIN((J-1)*AG)
      IF(MGSNV.EQ.O.AND.SUM*SGN.LT.O.DO) SUM=O.DO
   31 P(I,KTT+L)=SUM
   33 RETURN
      END
C
C
C
      FUNCTION TF(DX,DY)
      IMPLICIT REAL*8 (A-H,O-Z)
      TF=O.DO
      FD=1.DO-(DX*DX+DY*DY)
      IF(FD.LT.1.D-9) GO TO 2
      F1=DY*DY+(DX-O.6DO)*(DX-O.6DO)
```

```
      F2=DY*DY+(DX+0.6D0)*(DX+0.6D0)
      F3=DX*DX+(DY-0.6D0)*(DY-0.6D0)
      F4=DX*DX+(DY+0.6D0)*(DY+0.6D0)
      F1=DEXP(-6.D0*F1/FD)
      F2=0.5D0*DEXP(-6.D0*F2/FD)
      F3=DEXP(-6.D0*F3/FD)
      F4=0.5D0*DEXP(-6.D0*F4/FD)
      TF=F1+F2+F3+F4
    2 RETURN
      END
End of file
```

```
C      PROGRAM ICOM.NO2 (I.E. THE PROGRAM ICOM WITH THE TEST FUNCTION
C      TF=NO2)   -   PDP-11 VERSION
C
C
C
       IMPLICIT REAL*8 (A-H,P-Z)
       INTEGER A(86),V(61)
       VIRTUAL PF(30,43),CON(30,43),OF(63,60)
       DIMENSION U(15),H(15),REKSI(85,15),C(85),S(85),X(63),Y(60)
       DATA PI,A2/3.14159265DO,1.5D30/,
      1U(1),U(3),U(5),U(7),U(9),U(11),U(13),U(15)/0.201194094DO,
      20.3941513471DO,0.5709721726DO,0.7244177314DO,0.8482065834DO,
      30.9372733924DO,0.9879925180DO,0.DO/,H(1),H(3),H(5),H(7),H(9),
      4H(11),H(13),H(15)/0.1984314853DO,0.1861610001DO,0.1662692058DO,
      50.1395706779DO,0.1071592204DO,0.0703660475DO,0.0307532420DO,
      60.2025782419DO/
C READING 1 AND PRELIMINARY COMPUTATION
       READ(5,227)
       READ(5,*) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
       READ(5,*) (A(I),I=1,2*N)
       DO 5 K=1,N
       IF(A(2*K-1).LE.O.OR.A(2*K).LE.O) GO TO 180
     5 CONTINUE
       IF(MPLOT.GE.O) NET2=NET
       WRITE(6,200)
       WRITE(6,223)
       WRITE(6,*)
       WRITE(6,*)
       WRITE(6,227)
       DO 10 I=1,7
       U(2*I)=-U(2*I-1)
    10 H(2*I)=H(2*I-1)
       R=D/2.DO
       THETA=PI/N
       DELTA=D/(M-1)
       SPACE=D/(NET-1)
       DEG=PI/NET2
       PISQ=PI*PI
       DO 20 I=1,2*N-1
       C(I)=DCOS((I-N)*THETA)
    20 S(I)=DSIN((I-N)*THETA)
       DO 21 I=1,M
       DO 21 K=1,N
    21 PF(I,K)=1.5D30
C READING 2 AND CONTROL BLOCK 1
       IF(WL.NE.O.DO.OR.IC.GT.O) GO TO 42
       DO 30 K=1,N
       KY1=1
       KY2=A(2*K-1)
       DO 30 L=1,2
       DO 31 I=KY1,KY2
       Y(I)=(I-1)*DELTA-R
       XN=DABS((R-Y(I))*(R+Y(I)))
       XN=DSQRT(XN)
       SUM=O.DO
       DO 32 J=1,15
       X(J)=XN*U(J)
       XX=X(J)*C(K+N-1)-Y(I)*S(K+N-1)
       YY=X(J)*S(K+N-1)+Y(I)*C(K+N-1)
    32 SUM=SUM+TF(XX,YY)*H(J)
```

```
   31 PF(I,K)=SUM*XN
      KY1=M+1-A(2*K)
   30 KY2=M
      GO TO 40
   42 DO 41 K=1,N
      READ(5,*) (PF(I,K),I=1,A(2*K-1))
      READ(5,*) (PF(I,K),I=M+1-A(2*K),M)
      IF(PF(1,K).NE.O.DO.OR.PF(M,K).NE.O.DO) GO TO 180
   41 CONTINUE
   40 WRITE(6,209) R
      WRITE(6,216) IC
      IF(WL.NE.O.DO) WRITE(6,219) WL
      IF(GDC.EQ.O.DO) GO TO 43
      WRITE(6,222) GDC
      WL=WL/GDC
   43 IF(MSGNV.EQ.O) WRITE(6,212)
      WRITE(6,210) N,M
      IF(WL.EQ.O) GO TO 44
      WRITE(6,224)
      IF(M.LE.24) GO TO 46
      DO 47 K=1,N
   47 WRITE(6,226) K,(PF(I,K),I=1,M)
      GO TO 44
   46 DO 45 K=1,N
   45 WRITE(6,225) K,(PF(I,K),I=1,M)
C ZERO MOMENT OF PROJECTION FUNCTION
   44 LMIN=M-2
      DO 50 K=1,N
      DF1=O.DO
      DF2=O.DO
      IF(A(2*K-1).GE.2) DF1=PF(A(2*K-1),K)-PF(A(2*K-1)-1,K)
      IF(A(2*K).GE.2) DF2=PF(M+1-A(2*K),K)-PF(M+2-A(2*K),K)
      LMAX=M-A(2*K-1)-A(2*K)
      IF(LMAX.EQ.-1) LMAX=O
      IF(LMAX) 180,51,53
   53 DO 54 L=1,(LMAX+1)/2
      DF3=(PF(A(2*K-1)+L-1,K)-PF(M+2-L-A(2*K),K)+(DF1-DF2)/L)*2.DO
      KY1=(LMAX+3-2*L)*(LMAX+3-2*L)
      DF3=DF3/KY1
      PF(A(2*K-1)+L,K)=PF(A(2*K-1)+L-1,K)+DF1/L-DF3
   54 PF(M+1-A(2*K)-L,K)=PF(M+2-A(2*K)-L,K)+DF2/L+DF3
   51 SUM=O.DO
      DO 55 I=1,M
   55 SUM=SUM+PF(I,K)
      CON(2,K)=SUM-(PF(1,K)+PF(M,K))/2.DO
      IF(LMAX.LT.LMIN) LMIN=LMAX
   50 CONTINUE
      GSUM=O.DO
      DO 56 K=1,N
      LMAX=M-A(2*K-1)-A(2*K)
      IF(DABS(CON(2,K)).GT.DABS(GSUM).AND.LMAX.LE.LMIN) GSUM=CON(2,K)
   56 CONTINUE
      SGN=1.DO
      IF(GSUM.LT.O.DO) SGN=-1.DO
C INITIAL DEFINITION OF MISSING PART OF PROJECTION FUNCTION
      DO 60 K=1,N
      PFM=GSUM-CON(2,K)
      LMAX=M-A(2*K-1)-A(2*K)
      IF(LMAX.LE.O) GO TO 60
      KY1=O
```

```
      DO 61 I=1,LMAX
      L=(I+1)/2
   61 KY1=KY1+L
      PFM=PFM/KY1
      DO 62 L=1,(LMAX+1)/2
      DF3=PFM*L
      PF(A(2*K-1)+L,K)=PF(A(2*K-1)+L,K)+DF3
   62 PF(M+1-A(2*K)-L,K)=PF(M+1-A(2*K)-L,K)+DF3
   60 CONTINUE
C ITERATIONS
      WRITE(6,212)
      DO 100 ITR=1,20
C CONVOLUTION
      DO 70 K=1,N
      KY1=1
      KY2=2
      DO 70 L=1,2
      DO 72 I=KY1,M,2
      SUM=0.D0
      DO 73 J=KY2,M,2
   73 SUM=SUM+PF(J,K)/((J-I)*(J-I))
   72 CON(I,K)=(PF(I,K)/4.D0-SUM/PISQ)/DELTA
      KY1=2
   70 KY2=1
C INTEGRATION LINES THROUGH OBJECT SPACE IN DIFFERENT PROJECTIONS
      INDEX=0
      EAVR=0.D0
      DO 110 I=2,M-1
      Y(1)=(I-1)*DELTA-R
      XN=DABS((R-Y(1))*(R+Y(1)))
      XN=DSQRT(XN)
      DO 112 J=1,15
      X(J)=XN*U(J)
      DO 112 L=1,2*N-1
  112 REKSI(L,J)=(Y(1)*C(L)-X(J)*S(L)+R)/DELTA
      DO 110 X=1,N
      GSUM=0.D0
      DO 114 J=1,15
      SUM=0.D0
      DO 115 L=1,N
      KSI=REKSI(L+N-K,J)+1
      DKSI=KSI-REKSI(L+N-K,J)
      CONKSI=DKSI*CON(KSI,L)+(1.D0-DKSI)*CON(KSI+1,L)
  115 SUM=SUM+CONKSI
      SUM=SUM*THETA
      IF(MSGNV.EQ.0.D0.AND.SUM*SGN.LT.0.D0) SUM=0.D0
  114 GSUM=GSUM+SUM*H(J)
      GSUM=GSUM*XN
      IF(I.LE.A(2*K-1).OR.I.GT.M-A(2*K)) GO TO 111
      PF(I,K)=GSUM
      GO TO 110
  111 GSUM=GSUM-PF(I,K)
      GSUM=GSUM*GSUM
      EAVR=EAVR+GSUM
      INDEX=INDEX+1
  110 CONTINUE
C EVALUATION OF ITERATION
      DO 113 L=1,2*N-1
      REKSI(L,1)=R*(1.D0-S(L))/DELTA
  113 REKSI(L,2)=R*(1.D0+S(L))/DELTA
```

```
      ESUM=0.D0
      DO 116 K=1,N
      DO 116 J=1,2
      SUM=0.D0
      DO 117 L=1,N
      KSI=REKSI(L+N-K,J)+1
      DKSI=KSI-REKSI(L+N-K,J)
      CONKSI=DKSI*CON(KSI,L)+(1.D0-DKSI)*CON(KSI+1,L)
  117 SUM=SUM+CONKSI
      SUM=SUM*THETA
      SUM=SUM*SUM
  116 ESUM=ESUM+SUM
      ESUM=ESUM/(2*N)
      ESUM=DSQRT(ESUM)
      IF(WL.NE.0.D0) ESUM=ESUM*WL
      EAVR=EAVR/INDEX
      EAVR=DSQRT(EAVR)
      DF2=A2-EAVR
      WRITE(6,202) ITR,ESUM,EAVR
      IF(INDEX.EQ.N*(M-2)) GO TO 120
      IF(EAVR.GE.A2) GO TO 119
      A1=ESUM
      A2=EAVR
      A4=DF2
      DO 118 I=1,M
      DO 118 K=1,N
  118 OF(I,K)=CON(I,K)
  100 CONTINUE
      ITR=ITR-1
  119 IF(-DF2.LT.A4.AND.ITR.NE.2) GO TO 120
      IF(ESUM.LT.A1.AND.ITR.EQ.2) GO TO 120
      DO 134 I=1,M
      DO 134 K=1,N
  134 CON(I,K)=OF(I,K)
      ITR=ITR-1
C
C OBJECT FUNCTION AT PRESCRIBED POINTS
  120 DO 133 I=1,NET2+3
      DO 133 K=1,NET
  133 OF(I,K)=1.8E30
      DEX=(N*(M-2)-INDEX)*100.D0
      DEX=DEX/(N*M)
      WRITE(6,214) ITR,DEX
      KY1=0
      ESUM=0.D0
      EMAX=0.D0
      PFM=0.D0
      DO 130 J=1,NET2
      IF(MPLOT.GE.0) GO TO 135
      X(J)=(J-1)*DEG
      CO=DCOS(X(J))
      SI=DSIN(X(J))
      X(J)=X(J)/PI*180.D0
      GO TO 136
  135 X(J)=(J-1)*SPACE-R
      XN=X(J)
  136 DO 130 I=1,NET
      Y(I)=(I-1)*SPACE-R
      YN=Y(I)
      IF(MPLOT.GE.0) GO TO 137
```

```
      XN=Y(I)*CO
      YN=Y(I)*SI
  137 SUM=0.D0
      KY2=0
      IF(YN*YN+XN*XN.GE.R*R*9.9999999D-1) GO TO 130
      DO 132 K=1,N
      DKSI=(YN*C(N+K-1)-XN*S(N+K-1)+R)/DELTA
      IF(1-A(2*K-1)+DKSI.LT.1.D-8.OR.DKSI-(M-A(2*K)).GT.-1.D-8) KY2=1
      KSI=DKSI+1.D0
      DKSI=KSI-DKSI
      CONKSI=DKSI*CON(KSI,K)+(1.D0-DKSI)*CON(KSI+1,K)
  132 SUM=SUM+CONKSI
      IF(KY2.EQ.0) GO TO 130
      OF(J,I)=SUM*THETA
      IF(WL.NE.0.D0) OF(J,I)=OF(J,I)*WL
      IF(MSGNV.EQ.0.D0.AND.OF(J,I)*SGN.LT.0.D0) OF(J,I)=0.D0
      AB=DABS(OF(J,I))
      IF(WL.NE.0.D0) GO TO 131
C CONTROL BLOCK 2
      F=TF(XN,YN)
      AB=DABS(F)
      OF(J,I)=OF(J,I)-F
      EAB=DABS(OF(J,I))
      IF(EAB.GT.EMAX) EMAX=EAB
      ESUM=ESUM+EAB
      KY1=KY1+1
C
  131 IF(AB.GT.PFM) PFM=AB
  130 CONTINUE
      IF(WL.NE.0.D0) GO TO 150
      DO 140 I=1,NET2
      DO 140 J=1,NET
      IF(OF(I,J).LT.1.D30) OF(I,J)=OF(I,J)/PFM*100.D0
  140 CONTINUE
C CONTROL BLOCK 3
      EAVR=ESUM/KY1/PFM*100.D0
      EMAX=EMAX/PFM*100.D0
      WRITE(6,203)
      WRITE(6,202) KY1,EMAX,EAVR
C OUTPUT
  150 WRITE(6,204) PFM
      SCL2=1.D0
      CALL SCALE(SCL1,R)
      IF(MPLOT.GE.0) GO TO 151
      WRITE(6,220) SCL1
      GO TO 152
  151 WRITE(6,215) SCL1
  152 IF(WL.EQ.0.D0) GO TO 161
      CALL SCALE(SCL2,PFM)
      WRITE(6,217) SCL2
  161 DO 162 I=1,NET
      IF(MPLOT.GE.0) X(I)=X(I)*SCL1
      Y(I)=Y(I)*SCL1
      DO 162 K=1,NET2
      IF(OF(K,I).LT.1.D30) OF(K,I)=OF(K,I)*SCL2
  162 CONTINUE
      X(NET2+1)=1.5D30
      X(NET2+2)=1.5D30
      X(NET2+3)=1.5D30
      IF(MPLOT.LE.0) GO TO 160
```

```
      DO 164 I=1,NET
  164 V(I)=X(I)+DSIGN(5.D-1,X(I))
      WRITE(6,205) (V(I),I=1,NET)
      DO 166 I=1,NET
      V(1)=Y(NET+1-I)+DSIGN(5.D-1,Y(NET+1-I))
      DO 165 J=1,NET+2
      IF(OF(J,NET+1-I).GE.1.D30) OF(J,NET+1-I)=30000.DO
  165 V(J+1)=OF(J,NET+1-I)+DSIGN(5.D-1,OF(J,NET+1-I))
      IF(NET.LE.30) GO TO 167
      WRITE(6,218) (V(J),J=1,NET+1)
      GO TO 166
  167 WRITE(6,206) (V(J),J=1,NET+1)
  166 CONTINUE
      GO TO 190
  160 IF(MPLOT.EQ.O) GO TO 171
      WRITE(6,221)
      GO TO 172
  171 WRITE(6,211)
  172 DO 170 I=1,NET2,4
      WRITE(6,207) X(I),Y(NET),OF(I,NET),X(I+1),Y(NET),OF(I+1,NET),
     1X(I+2),Y(NET),OF(I+2,NET),X(I+3),Y(NET),OF(I+3,NET)
  170 WRITE(6,208) (Y(NET-J),OF(I,NET-J),Y(NET-J),OF(I+1,NET-J),
     1Y(NET-J),OF(I+2,NET-J),Y(NET-J),OF(I+3,NET-J), J=1,NET-1)
      GO TO 190
  180 WRITE(6,201) K
  190 STOP
C
  200 FORMAT(/T33,'RECONSTRUCTION FROM INCOMPLETE PROJECTIONS'/)
  201 FORMAT(//T5,'ERROR IN INPUT DATA, PROJECTION:',I4)
  202 FORMAT(/T5,I4,2(20X,E11.4))
  203 FORMAT(/'NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE
     1 ERRORS IN PERCENTS:'/)
  204 FORMAT(/'MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:',3X,E11.4)
  205 FORMAT(//'Y \ X:',1X,30I4/7X,30I4/)
  206 FORMAT(/I5,2X,30I4)
  207 FORMAT(12F10.2)
  208 FORMAT(4(10X,2F10.2))
  209 FORMAT(/'ZERO OBJECT FIELD OUTSIDE THE RADIUS:',F14.6)
  210 FORMAT(/'NUMBER OF PROJECTIONS:',I7,20X,'NUMBER OF RAYS IN EACH
     1 PROJECTION:',I7/)
  211 FORMAT(/T8,3('X',9X,'Y',19X),'X',9X,'Y'/)
  212 FORMAT(/'NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED'/)
  213 FORMAT(/'ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE
     1AVAILABLE PROJECTION ERROR:'/)
  214 FORMAT(/'RESULT IS FROM ITERATION:',I4/'MISSING PART OF THE
     1PROJECTION DATA IN PERCENTS:',F10.1)
  215 FORMAT(/'X AND Y COORDINATES MULTIPLIED BY:',5X,E10.3)
  216 FORMAT(/'INTERPOLATION COEFFICIENT:',15X,I3)
  217 FORMAT(/'THE OBJECT FUNCTION MULTIPLIED BY:',5X,E10.3)
  218 FORMAT(/I5,2X,30I4/7X,31I4/)
  219 FORMAT(/'WAVELENGTH:',31X,E11.4)
  220 FORMAT(/'THE RADIUS R IS MULTIPLIED BY:',9X,E10.3)
  221 FORMAT(/T7,3('DEG',8X,'R',18X),'DEG',8X,'R'/)
  222 FORMAT(/'GLADSTONE-DALE CONSTANT:',18X,E11.4)
  223 FORMAT(T35,'(BY THE ITERATION CONVOLUTION METHOD)'/)
  224 FORMAT(/'PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF
     1 INTERFERENCE FRINGES:'/)
  225 FORMAT(I4,4X,24(F5.1))
  226 FORMAT(I4,4X,24(F5.1)/8X,24(F5.1))
  227 FORMAT('AN ARBITRARY TEXT UP TO 120 CHARACTERS  123456789 12345678
```

```
     19 123456789 123456789 123456789 123456789 123456789 123456789 ')
      END
C
C
C
      SUBROUTINE SCALE(SCL,Q)
      IMPLICIT REAL*8 (S,Q)
      SCL=1.DO
      IF(Q.LT.1.D-30) RETURN
    2 IF(Q.LT.999.5DO) GO TO 1
      Q=Q/10.DO
      SCL=SCL/10.DO
      GO TO 2
    1 IF(Q.GE.99.5DO) RETURN
      Q=Q*10.DO
      SCL=SCL*10.DO
      GO TO 1
      END
C
C
      FUNCTION TF(DX,DY)
      IMPLICIT REAL*8 (A-H,O-Z)
      TF=0.DO
      FD=1.DO-(DX*DX+DY*DY)
      IF(FD.LT.1.D-9) GO TO 2
      F1=DY*DY+(DX-0.6DO)*(DX-0.6DO)
      F2=DY*DY+(DX+0.6DO)*(DX+0.6DO)
      F3=DX*DX+(DY-0.6DO)*(DY-0.6DO)
      F4=DX*DX+(DY+0.6DO)*(DY+0.6DO)
      F1=DEXP(-6.DO*F1/FD)
      F2=0.5DO*DEXP(-6.DO*F2/FD)
      F3=DEXP(-6.DO*F3/FD)
      F4=0.5DO*DEXP(-6.DO*F4/FD)
      TF=F1+F2+F3+F4
    2 RETURN
      END

End of file
```

```
C      PROGRAM INTEP2 (I.E. THE PROGRAM INTEP WITH THE TEST FUNCTION
C      TF=NO2)    -    IBM VERSION
C
C
C
       BLOCK DATA
       IMPLICIT REAL*8 (A-H,R-Z)
       COMMON /B1/DPI,SGN,P,PF,I,MIF,MI,KH,IC,N,MSGNV
       DIMENSION P(19,108),PF(38,55)
       DATA P/2052*1.5E30/,PF/2090*1.5E30/
       END
C
       IMPLICIT REAL*8 (A-H,R-Z)
       INTEGER A(1C8)
       COMMON /B1/DPI,SGN,P,PF,I,MIF,MI,KH,IC,N,MSGNV
       DIMENSION P(19,108),PF(38,55),U(15),H(15),C(107),S(107),X(16),Y(37)
       DATA SPI/3.14159265DO/,
      1U(1),U(3),U(5),U(7),U(9),U(11),U(13),U(15)/0.201194094DO,
      20.394151347 1DO,0.5709721726DO,0.7244177314DO,0.8482065834DO,
      30.9372733924DO,0.9879925180DO,0.DO/,H(1),H(3),H(5),H(7),H(9),
      4H(11),H(13),H(15)/0.1984314853DO,0.1861610001DO,0.1662692058DO,
      50.1395706779DO,0.1071592204DO,0.0703660475DO,0.0307532420DO,
      60.2025782419DO/
C READING 1 AND PRELIMINARY COMPUTATION
  228 FORMAT(7I5,3G13.6)
  229 FORMAT(86I4)
  230 FORMAT(30F13.6)
       READ(4,200)
  200 FORMAT('AN ARBITRARY TEXT UP TO 120 CHARACTERS  123456789 12345678
     19 123456789 123456789 123456789 123456789 123456789 123456789 ')
       READ(4,228) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
       N2=2*N
       N2M1=N2-1
       READ(4,229) (A(I),I=1,N2)
       DO 5 I=1,N2
       IF(A(I).LE.O) GO TO 100
    5 CONTINUE
       DO 10 I=1,7
       U(2*I)=-U(2*I-1)
   10 H(2*I)=H(2*I-1)
       R=D/2.DO
       THETA=SPI/N
       DELTA=D/(M-1)
       DPI=SPI*2.DO
       DO 20 I=1,N2M1
       C(I)=DCOS((I-N)*THETA)
   20 S(I)=DSIN((I-N)*THETA)
C READING 2 AND CONTROL BLOCK
       IF(WL.NE.O.DO) GO TO 42
       DO 30 K=1,N
       KY1=1
       KY2=A(2*K-1)
       DO 30 L=1,2
       DO 31 I=KY1,KY2
       Y(I)=(I-1)*DELTA-R
       XN=DABS((R-Y(I))*(R+Y(I)))
       XN=DSQRT(XN)
       SUM=O.DO
       DO 32 J=1,15
       X(J)=XN*U(J)
```

```
      XX=X(J)*C(K+N-1)-Y(I)*S(K+N-1)
      YY=X(J)*S(K+N-1)+Y(I)*C(K+N-1)
   32 SUM=SUM+TF(XX,YY)*H(J)
   31 PF(I,K)=SUM*XN
      KY1=M+1-A(2*K)
   30 KY2=M
      GO TO 40
   42 DO 41 K=1,N
      IA=A(2*K-1)
      IB=M+1-A(2*K)
      READ(4,230) (PF(I,K),I=1,IA)
   41 READ(4,230) (PF(I,K),I=IB,M)
   40 IF(IC.LE.1) GO TO 100
      GSUM=0.D0
      DO 43 K=1,N
      DO 43 I=1,M
      IF(PF(I,K).LT.1.E30.AND.ABS(PF(I,K)).GT.DABS(GSUM)) GSUM=PF(I,K)
   43 CONTINUE
      SGN=1.D0
      IF(GSUM.LT.0.D0) SGN=-1.D0
C PROJECTION FUNCTION
      KY1=(M+1)/2
      DO 60 K=1,N
      DO 60 I=1,KY1
   60 PF(I,N+K)=PF(M-I+1,K)
      MIF=0
      DO 70 I=1,KY1
      PF(I,N2+1)=PF(I,1)
      KH=0
      KD=0
      DO 71 K=1,N2
      IF(PF(I,K).GT.1.E30.AND.PF(I,K+1).LT.1.E30) KH=K
      IF(PF(I,K).LT.1.E30.AND.PF(I,K+1).GT.1.E30) GO TO 80
   71 CONTINUE
      IF(KH.EQ.0.AND.KD.EQ.0.AND.PF(I,1).GT.1.E30) GO TO 70
      IF(KD.NE.0) MI=N2+KD-KH
      IF(KH.EQ.0.AND.KD.EQ.0) MI=N2
      IF(KH.NE.0.AND.KD.EQ.0) GO TO 70
      CALL INTP
   70 CONTINUE
      N=IC*N
      N2=2*N
      DO 90 K=1,N
      DO 90 I=1,KY1
      PF(I,K)=P(I,K)
   90 PF(M+1-I,K)=P(I,N+K)
C BOUNDARY
      DO 50 K=1,N
      PF(M+1,K)=0.
      A(2*K-1)=(M+1)/2
      A(2*K)=A(2*K-1)
      DO 50 I=1,M
      IF(PF(I,K).LT.1.E30.AND.PF(I+1,K).GT.1.E30) A(2*K-1)=I
      IF(PF(I,K).GT.1.E30.AND.PF(I+1,K).LT.1.E30) A(2*K)=M-I
   50 CONTINUE
      GO TO 100
C
C
   80 IF(KH.NE.0) GO TO 81
      KD=K
```

```
      GO TO 71
   81 MI=K-KH
      CALL INTP
      GO TO 71
C
C
  100 WRITE(5,200)
      WRITE(5,228) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
      WRITE(5,229) (A(I),I=1,N2)
      DO 111 K=1,N
      IA=A(2*K-1)
      IB=M+1-A(2*K)
      WRITE(5,230) (PF(I,K),I=1,IA)
  111 WRITE(5,230) (PF(I,K),I=IB,M)
      STOP
      END
C
C
C
      SUBROUTINE INTP
      IMPLICIT REAL*8 (A-H,R-Z)
      COMMON /B1/DPI,SGN,P,PF,I,MIF,MI,KH,IC,N,MSGNV
      DIMENSION P(19,108),PF(38,55),AF(28),BF(28),DC(28,54),DS(28,54)
C
      IF(MI.EQ.1) GO TO 30
      IF(MI.EQ.MIF) GO TO 10
      NN=MI/2
      NN1=NN+1
      DPM=DPI/MI
      DPN=DPM/IC
      DO 11 J=1,NN1
      DO 11 K=1,MI
      AG=(J-1)*(K-1)*DPM
      DC(J,K)=DCOS(AG)
   11 DS(J,K)=DSIN(AG)
      MIF=MI
   10 C=2.D0/MI
      DO 20 J=1,NN1
      AF(J)=0.D0
      BF(J)=0.D0
      IF(2*(J-1).EQ.MI) C=1.D0/MI
      DO 21 K=1,MI
      KT=KH+K
      IF(KT.GT.2*N) KT=KT-2*N
      AF(J)=AF(J)+PF(I,KT)*DC(J,K)
   21 BF(J)=BF(J)+PF(I,KT)*DS(J,K)
      AF(J)=AF(J)*C
   20 BF(J)=BF(J)*C
   30 DO 31 K=1,MI
      KT=KH+K
      IF(KT.GT.2*N) KT=KT-2*N
      KTT=IC*(KT-1)+1
      P(I,KTT)=PF(I,KT)
      IF(MI.EQ.1.OR.K.EQ.MI.AND.MI.NE.2*N) GO TO 33
      ICM1=IC-1
      DO 31 L=1,ICM1
      SUM=AF(1)/2.D0
      AG=DPN*(IC*(K-1)+L)
      DO 32 J=2,NN1
   32 SUM=SUM+AF(J)*DCOS((J-1)*AG)+BF(J)*DSIN((J-1)*AG)
```

```
      IF(MGSNV.EQ.O.AND.SUM*SGN.LT.O.DO) SUM=O.DO
   31 P(I,KTT+L)=SUM
   33 RETURN
      END
C
C
C
      FUNCTION TF(DX,DY)
      IMPLICIT REAL*8 (A-H,O-Z)
      TF=O.DO
      FD=1.DO-(DX*DX+DY*DY)
      IF(FD.LT.1.D-9) GO TO 2
      F1=DY*DY+(DX-O.6DO)*(DX-O.6DO)
      F2=DY*DY+(DX+O.6DO)*(DX+O.6DO)
      F3=DX*DX+(DY-O.6DO)*(DY-O.6DO)
      F4=DX*DX+(DY+O.6DO)*(DY+O.6DO)
      F1=DEXP(-6.DO*F1/FD)
      F2=O.5DO*DEXP(-6.DO*F2/FD)
      F3=DEXP(-6.DO*F3/FD)
      F4=O.5DO*DEXP(-6.DC*F4/FD)
      TF=F1+F2+F3+F4
    2 RETURN
      END
End of file
```

```
C      PROGRAM ICOM2 (I.E. THE PROGRAM ICOM WITH THE TEST FUNCTION
C      TF=NO2)   -   IBM VERSION
C
C
C
       IMPLICIT REAL*8 (A-H,O-Z)
       INTEGER A(86),V(61)
       DIMENSION U(15),H(15),REKSI(85,15),C(85),S(85),X(63),Y(60),PF(30,43),CON(30,43),OF(63,60)
       DATA PI,A2/3.14159265DO,1.5D30/,
      1U(1),U(3),U(5),U(7),U(9),U(11),U(13),U(15)/0.201194094DO,
      20.3941513471DO,0.5709721726DO,0.7244177314DO,0.8482065834DO,
      30.9372733924DO,0.9879925180DO,0.DO/,H(1),H(3),H(5),H(7),H(9),
      4H(11),H(13),H(15)/0.1984314853DO,0.1861610001DO,0.1662692058DO,
      50.1395706779DO,0.1071592204DO,0.0703660475DO,0.0307532420DO,
      60.2025782419DO/
C READING 1 AND PRELIMINARY COMPUTATION
       READ(5,227)
       READ(5,228) MPLOT,MSGNV,IC,N,M,NET,NET2,D,WL,GDC
       N2=2*N
       N2M1=N2-1
       READ(5,229) (A(I),I=1,N2)
       DO 5 K=1,N
       IF(A(2*K-1).LE.O.OR.A(2*K).LE.O) GO TO 180
     5 CONTINUE
       IF(MPLOT.GE.O) NET2=NET
       WRITE(6,200)
       WRITE(6,223)
       WRITE(6,225)
       WRITE(6,225)
       WRITE(6,227)
       DO 10 I=1,7
       U(2*I)=-U(2*I-1)
    10 H(2*I)=H(2*I-1)
       R=D/2.DO
       THETA=PI/N
       DELTA=D/(M-1)
       SPACE=D/(NET-1)
       DEG=PI/NET2
       PISQ=PI*PI
       DO 20 I=1,N2M1
       C(I)=DCOS((I-N)*THETA)
    20 S(I)=DSIN((I-N)*THETA)
       DO 21 I=1,M
       DO 21 K=1,N
    21 PF(I,K)=1.5D30
C READING 2 AND CONTROL BLOCK 1
       IF(WL.NE.O.DO.OR.IC.GT.O) GO TO 42
       DO 30 K=1,N
       KY1=1
       KY2=A(2*K-1)
       DO 30 L=1,2
       DO 31 I=KY1,KY2
       Y(I)=(I-1)*DELTA-R
       XN=DABS((R-Y(I))*(R+Y(I)))
       XN=DSQRT(XN)
       SUM=0.DO
       DO 32 J=1,15
       X(J)=XN*U(J)
       XX=X(J)*C(K+N-1)-Y(I)*S(K+N-1)
       YY=X(J)*S(K+N-1)+Y(I)*C(K+N-1)
```

```
   32 SUM=SUM+TF(XX,YY)*H(J)
   31 PF(I,K)=SUM*XN
      KY1=M+1-A(2*K)
   30 KY2=M
      GO TO 40
   42 DO 41 K=1,N
      IA=A(2*K-1)
      IB=M+1-A(2*K)
      READ(5,230) (PF(I,K),I=1,IA)
      READ(5,230) (PF(I,K),I=IB,M)
      IF(PF(1,K).NE.O.DO.OR.PF(M,K).NE.O.DO) GO TO 180
   41 CONTINUE
   40 WRITE(6,209) R
      WRITE(6,216) IC
      IF(WL.NE.O.DO) WRITE(6,219) WL
      IF(GDC.EQ.O.DO) GO TO 43
      WRITE(6,222) GDC
      WL=WL/GDC
   43 IF(MSGNV.EQ.O) WRITE(6,212)
      WRITE(6,210) N,M
      IF(WL.EQ.O) GO TO 44
      WRITE(6,224)
      IF(M.LE.24) GO TO 46
      DC 47 K=1,N
   47 WRITE(6,226) K,(PF(I,K),I=1,M)
      GO TO 44
   46 DO 45 K=1,N
   45 WRITE(6,225) K,(PF(I,K),I=1,M)
C ZERO MOMENT OF PROJECTION FUNCTION
   44 LMIN=M-2
      DO 50 K=1,N
      DF1=O.DO
      DF2=O.DO
      IF(A(2*K-1).GE.2) DF1=PF(A(2*K-1),K)-PF(A(2*K-1)-1,K)
      IF(A(2*K).GE.2) DF2=PF(M+1-A(2*K),K)-PF(M+2-A(2*K),K)
      LMAX=M-A(2*K-1)-A(2*K)
      IF(LMAX.EQ.-1) LMAX=O
      IF(LMAX) 180,51,53
   53 LMA=(LMAX+1)/2
      DO 54 L=1,LMA
      DF3=(PF(A(2*K-1)+L-1,K)-PF(M+2-L-A(2*K),K)+(DF1-DF2)/L)*2.DO
      KY1=(LMAX+3-2*L)*(LMAX+3-2*L)
      DF3=DF3/KY1
      PF(A(2*K-1)+L,K)=PF(A(2*K-1)+L-1,K)+DF1/L-DF3
   54 PF(M+1-A(2*K)-L,K)=PF(M+2-A(2*K)-L,K)+DF2/L+DF3
   51 SUM=O.DO
      DO 55 I=1,M
   55 SUM=SUM+PF(I,K)
      CON(2,K)=SUM-(PF(1,K)+PF(M,K))/2.DO
      IF(LMAX.LT.LMIN) LMIN=LMAX
   50 CONTINUE
      GSUM=O.DO
      DO 56 K=1,N
      LMAX=M-A(2*K-1)-A(2*K)
      IF(DABS(CON(2,K)).GT.DABS(GSUM).AND.LMAX.LE.LMIN) GSUM=CON(2,K)
   56 CONTINUE
      SGN=1.DO
      IF(GSUM.LT.O.DO) SGN=-1.DO
C INITIAL DEFINITION OF MISSING PART OF PROJECTION FUNCTION
      DO 60 K=1,N
```

```
      PFM=GSUM-CON(2,K)
      LMAX=M-A(2*K-1)-A(2*K)
      IF(LMAX.LE.0) GO TO 60
      KY1=0
      DO 61 I=1,LMAX
      L=(I+1)/2
   61 KY1=KY1+L
      PFM=PFM/KY1
      LMA=(LMAX+1)/2
      DO 62 L=1,LMA
      DF3=PFM*L
      PF(A(2*K-1)+L,K)=PF(A(2*K-1)+L,K)+DF3
   62 PF(M+1-A(2*K)-L,K)=PF(M+1-A(2*K)-L,K)+DF3
   60 CONTINUE
C ITERATIONS
      WRITE(6,213)
      DO 100 ITR=1,20
C CONVOLUTION
      DO 70 K=1,N
      KY1=1
      KY2=2
      DO 70 L=1,2
      DO 72 I=KY1,M,2
      SUM=0.D0
      DO 73 J=KY2,M,2
   73 SUM=SUM+PF(J,K)/((J-I)*(J-I))
   72 CON(I,K)=(PF(I,K)/4.D0-SUM/PISQ)/DELTA
      KY1=2
   70 KY2=1
C INTEGRATION LINES THROUGH OBJECT SPACE IN DIFFERENT PROJECTIONS
      INDEX=0
      EAVR=0.D0
      MM1=M-1
      DO 110 I=2,MM1
      Y(1)=(I-1)*DELTA-R
      XN=DABS((R-Y(1))*(R+Y(1)))
      XN=DSQRT(XN)
      DO 112 J=1,15
      X(J)=XN*U(J)
      DO 112 L=1,N2M1
  112 REKSI(L,J)=(Y(1)*C(L)-X(J)*S(L)+R)/DELTA
      DO 110 K=1,N
      GSUM=0.D0
      DO 114 J=1,15
      SUM=0.D0
      DO 115 L=1,N
      KSI=REKSI(L+N-K,J)+1
      DKSI=KSI-REKSI(L+N-K,J)
      CONKSI=DKSI*CON(KSI,L)+(1.D0-DKSI)*CON(KSI+1,L)
  115 SUM=SUM+CONKSI
      SUM=SUM*THETA
      IF(MSGNV.EQ.0.D0.AND.SUM*SGN.LT.0.D0) SUM=0.D0
  114 GSUM=GSUM+SUM*H(J)
      GSUM=GSUM*XN
      IF(I.LE.A(2*K-1).OR.I.GT.M-A(2*K)) GO TO 111
      PF(I,K)=GSUM
      GO TO 110
  111 GSUM=GSUM-PF(I,K)
      GSUM=GSUM*GSUM
      EAVR=EAVR+GSUM
```

```
      INDEX=INDEX+1
  110 CONTINUE
C EVALUATION OF ITERATION
      DO 113 L=1,N2M1
      REKSI(L,1)=R*(1.DO-S(L))/DELTA
  113 REKSI(L,2)=R*(1.DO+S(L))/DELTA
      ESUM=O.DO
      DO 116 K=1,N
      DO 116 J=1,2
      SUM=O.DO
      DO 117 L=1,N
      KSI=REKSI(L+N-K,J)+1
      DKSI=KSI-REKSI(L+N-K,J)
      CONKSI=DKSI*CON(KSI,L)+(1.DO-DKSI)*CON(KSI+1,L)
  117 SUM=SUM+CONKSI
      SUM=SUM*THETA
      SUM=SUM*SUM
  116 ESUM=ESUM+SUM
      ESUM=ESUM/(N2)
      ESUM=DSQRT(ESUM)
      IF(WL.NE.O.DO) ESUM=ESUM*WL
      EAVR=EAVR/INDEX
      EAVR=DSQRT(EAVR)
      DF2=A2-EAVR
      WRITE(6,202) ITR,ESUM,EAVR
      IF(INDEX.EQ.N*(M-2)) GO TO 120
      IF(EAVR.GE.A2) GO TO 119
      A1=ESUM
      A2=EAVR
      A4=DF2
      DO 118 I=1,M
      DO 118 K=1,N
  118 OF(I,K)=CON(I,K)
  100 CONTINUE
      ITR=ITR-1
  119 IF(-DF2.LT.A4.AND.ITR.NE.2) GO TO 120
      IF(ESUM.LT.A1.AND.ITR.EQ.2) GO TO 120
      DO 134 I=1,M
      DO 134 K=1,N
  134 CON(I,K)=OF(I,K)
      ITR=ITR-1
C
C OBJECT FUNCTION AT PRESCRIBED POINTS
  120 NET23=NET2+3
      DO 133 I=1,NET23
      DO 133 K=1,NET
  133 OF(I,K)=1.5E30
      DEX=(N*(M-2)-INDEX)*100.DO
      DEX=DEX/(N*M)
      WRITE(6,214) ITR,DEX
      KY1=O
      ESUM=O.DO
      EMAX=O.DO
      PFM=O.DO
      DO 130 J=1,NET2
      IF(MPLOT.GE.O) GO TO 135
      X(J)=(J-1)*DEG
      CO=DCOS(X(J))
      SI=DSIN(X(J))
      X(J)=X(J)/PI*180.DO
```

```
      GO TO 136
  135 X(J)=(J-1)*SPACE-R
      XN=X(J)
  136 DO 130 I=1,NET
      Y(I)=(I-1)*SPACE-R
      YN=Y(I)
      IF(MPLOT.GE.O) GO TO 137
      XN=Y(I)*CO
      YN=Y(I)*SI
  137 SUM=O.DO
      KY2=O
      IF(YN*YN+XN*XN.GE.R*R*9.9999999D-1) GO TO 130
      DO 132 K=1,N
      DKSI=(YN*C(N+K-1)-XN*S(N+K-1)+R)/DELTA
      IF(1-A(2*K-1)+DKSI.LT.1.D-8.OR.DKSI-(M-A(2*K)).GT.-1.D-8) KY2=1
      KSI=DKSI+1.DO
      DKSI=KSI-DKSI
      CONKSI=DKSI*CON(KSI,K)+(1.DO-DKSI)*CON(KSI+1,K)
  132 SUM=SUM+CONKSI
      IF(KY2.EQ.O) GO TO 130
      OF(J,I)=SUM*THETA
      IF(WL.NE.O.DO) OF(J,I)=OF(J,I)*WL
      IF(MSGNV.EQ.O.DO.AND.OF(J,I)*SGN.LT.O.DO) OF(J,I)=O.DO
      AB=DABS(OF(J,I))
      IF(WL.NE.O.DO) GO TO 131
C CONTROL BLOCK 2
      F=TF(XN,YN)
      AB=DABS(F)
      OF(J,I)=OF(J,I)-F
      EAB=DABS(OF(J,I))
      IF(EAB.GT.EMAX) EMAX=EAB
      ESUM=ESUM+EAB
      KY1=KY1+1
C
  131 IF(AB.GT.PFM) PFM=AB
  130 CONTINUE
      IF(WL.NE.O.DO) GO TO 150
      DO 140 I=1,NET2
      DO 140 J=1,NET
      IF(OF(I,J).LT.1.D30) OF(I,J)=OF(I,J)/PFM*100.DO
  140 CONTINUE
C CONTROL BLOCK 3
      EAVR=ESUM/KY1/PFM*100.DO
      EMAX=EMAX/PFM*100.DO
      WRITE(6,203)
      WRITE(6,202) KY1,EMAX,EAVR
C OUTPUT
  150 WRITE(6,204) PFM
      NETM1=NET-1
      NET1=NET+1
      NE2=NET+2
      SCL2=1.DO
      CALL SCALE(SCL1,R)
      IF(MPLOT.GE.O) GO TO 151
      WRITE(6,220) SCL1
      GO TO 152
  151 WRITE(6,215) SCL1
  152 IF(WL.EQ.O.DO) GO TO 161
      CALL SCALE(SCL2,PFM)
      WRITE(6,217) SCL2
```

```
  161 DO 162 I=1,NET
      IF(MPLOT.GE.O) X(I)=X(I)*SCL1
      Y(I)=Y(I)*SCL1
      DO 162 K=1,NET2
      IF(OF(K,I).LT.1.D30) OF(K,I)=OF(K,I)*SCL2
  162 CONTINUE
      X(NET2+1)=1.5D30
      X(NET2+2)=1.5D30
      X(NET23)=1.5D30
      IF(MPLOT.LE.O) GO TO 160
      DO 164 I=1,NET
  164 V(I)=X(I)+DSIGN(5.D-1,X(I))
      WRITE(6,205) (V(I),I=1,NET)
      DO 166 I=1,NET
      V(1)=Y(NET1-I)+DSIGN(5.D-1,Y(NET1-I))
      DO 165 J=1,NE2
      IF(OF(J,NET1-I).GE.1.D30) OF(J,NET1-I)=30000.DO
  165 V(J+1)=OF(J,NET1-I)+DSIGN(5.D-1,OF(J,NET1-I))
      IF(NET.LE.30) GO TO 167
      WRITE(6,218) (V(J),J=1,NET1)
      GO TO 166
  167 WRITE(6,206) (V(J),J=1,NET1)
  166 CONTINUE
      GO TO 190
  160 IF(MPLOT.EQ.O) GO TO 171
      WRITE(6,221)
      GO TO 172
  171 WRITE(6,211)
  172 DO 170 I=1,NET2,4
      WRITE(6,207) X(I),Y(NET),OF(I,NET),X(I+1),Y(NET),OF(I+1,NET),
     1X(I+2),Y(NET),OF(I+2,NET),X(I+3),Y(NET),OF(I+3,NET)
  170 WRITE(6,208) (Y(NET-J),OF(I,NET-J),Y(NET-J),OF(I+1,NET-J),
     1Y(NET-J),OF(I+2,NET-J),Y(NET-J),OF(I+3,NET-J), J=1,NETM1)
      GO TO 190
  180 WRITE(5,201) K
  190 STOP
C
  200 FORMAT(/T33,'RECONSTRUCTION FROM INCOMPLETE PROJECTIONS'/)
  201 FORMAT(//T5,'ERROR IN INPUT DATA, PROJECTION:',I4)
  202 FORMAT(/T5,I4,2(20X,E11.4))
  203 FORMAT(/'NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE',
     1' ERRORS IN PERCENTS:'/)
  204 FORMAT(/'MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:',3X,E11.4)
  205 FORMAT(//'Y \ X:',1X,30I4/7X,30I4/)
  206 FORMAT(/I5,2X,30I4)
  207 FORMAT(12F10.2)
  208 FORMAT(4(10X,2F10.2))
  209 FORMAT(/'ZERO OBJECT FIELD OUTSIDE THE RADIUS:',F14.6)
  210 FORMAT(/'NUMBER OF PROJECTIONS:',I7,20X,'NUMBER OF RAYS IN EACH',
     1' PROJECTION:',I7/)
  211 FORMAT(/T8,3('X',9X,'Y',19X),'X',9X,'Y'/)
  212 FORMAT(/'NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED'/)
  213 FORMAT(/'ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE',
     1' AVAILABLE PROJECTION ERROR:'/)
  214 FORMAT(/'RESULT IS FROM ITERATION:',I4/'MISSING PART OF THE',
     1' PROJECTION DATA IN PERCENTS:',F10.1)
  215 FORMAT(/'X AND Y COORDINATES MULTIPLIED BY:',5X,E10.3)
  216 FORMAT(/'INTERPOLATION COEFFICIENT:',15X,I3)
  217 FORMAT(/'THE OBJECT FUNCTION MULTIPLIED BY:',5X,E10.3)
  218 FORMAT(/I5,2X,30I4/7X,31I4/)
```

```
  219 FORMAT(/'WAVELENGTH:',31X,E11.4)
  220 FORMAT(/'THE RADIUS R IS MULTIPLIED BY:',9X,E10.3)
  221 FORMAT(/T7,3('DEG',8X,'R',18X),'DEG',8X,'R'/)
  222 FORMAT(/'GLADSTONE-DALE CONSTANT:',18X,E11.4)
  223 FORMAT(T35,'(BY THE ITERATION CONVOLUTION METHOD)'/)
  224 FORMAT(/'PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF',
     1' INTERFERENCE FRINGES:'/)
  225 FORMAT(I4,4X,24(F5.1))
  226 FORMAT(I4,4X,24(F5.1)/8X,24(F5.1))
  227 FORMAT('AN ARBITRARY TEXT UP TO 120 CHARACTERS  123456789 12345678
     19 123456789 123456789 123456789 123456789 123456789 123456789 ')
  228 FORMAT(7I5,3G13.6)
  229 FORMAT(86I4)
  230 FORMAT(30F13.6)
      END
C
C
C
      SUBROUTINE SCALE(SCL,Q)
      IMPLICIT REAL*8 (S,Q)
      SCL=1.DO
      IF(Q.LT.1.D-30) RETURN
    2 IF(Q.LT.999.5DO) GO TO 1
      Q=Q/10.DO
      SCL=SCL/10.DO
      GO TO 2
    1 IF(Q.GE.99.5DO) RETURN
      Q=Q*10.DO
      SCL=SCL*10.DO
      GO TO 1
      END
C
C
      FUNCTION TF(DX,DY)
      IMPLICIT REAL*8 (A-H,O-Z)
      TF=0.DO
      FD=1.DO-(DX*DX+DY*DY)
      IF(FD.LT.1.D-9) GO TO 2
      F1=DY*DY+(DX-0.6DO)*(DX-0.6DO)
      F2=DY*DY+(DX+0.6DO)*(DX+0.6DO)
      F3=DX*DX+(DY-0.6DO)*(DY-0.6DO)
      F4=DX*DX+(DY+0.6DO)*(DY+0.6DO)
      F1=DEXP(-6.DO*F1/FD)
      F2=0.5DO*DEXP(-6.DO*F2/FD)
      F3=DEXP(-6.DO*F3/FD)
      F4=0.5DO*DEXP(-6.DO*F4/FD)
      TF=F1+F2+F3+F4
    2 RETURN
      END
End of file
```

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```
C      PROGRAM SEEX2 (I.E. THE PROGRAM SEEX WITH THE TEST FUNCTION
C      TF=NO2)   -   IBM VERSION
C
C
C
       BLOCK DATA
       IMPLICIT REAL*8 (A-H,O-Z)
       COMMON/S2/OF
       COMMON/S3/P
       COMMON/S4/PT
       COMMON/S5/COST
       COMMON/S6/SINT
       COMMON/S7/WIJ
       DIMENSION OF(63,60),
      2P(15,900),PT(15,900),COST(900,15),SINT(900,15),WIJ(90000)
       COMMON/SUB/R,CXYL,PI,MN,N,M
       DIMENSION CXYL(100,1)
       DATA PI/3.141592653589793/,OF/3780*1.5D30/
       END
C
       IMPLICIT REAL*8 (A-H,O-Z)
       NAMELIST /NAM/D,WL,GDC,MSGNV,EPSL,NN,N,M,MPLOT,NET,NET2
       INTEGER V(61)
       LOGICAL LWL,LPLOT,LK21,LSGNV
       COMMON/S2/OF
       COMMON/S3/P
       COMMON/S4/PT
       COMMON/S5/COST
       COMMON/S6/SINT
       COMMON/S7/WIJ
       DIMENSION U(15),H(15),C(36),S(36),HLP(36),X(63),Y(60),OF(63,60),
      1MAM(36),RHO(900),RHOB(72),THETA(900),PF(900),RN2(900),
      2P(15,900),PT(15,900),COST(900,15),SINT(900,15),WIJ(90000),
      3IPIV(100),AUX(200,1),CXYL(100,1)
       DATA
      1U(1),U(3),U(5),U(7),U(9),U(11),U(13),U(15)/0.201194094D0,
      20.3941513471D0,0.5709721726D0,0.7244177314D0,0.8482065834D0,
      30.9372733924D0,0.9879925180D0,0.D0/,H(1),H(3),H(5),H(7),H(9),
      4H(11),H(13),H(15)/0.1984314853D0,0.1861610001D0,0.1662692058D0,
      50.1395706779D0,0.1071592204D0,0.0703660475D0,0.0307532420D0,
      60.2025782419D0/
       COMMON/SUB/R,CXYL,PI,MN,N,M
C INPUT ARRANGEMENTS
       READ(5,302)
       READ(5,NAM)
       LWL=WL.NE.0.
       LPLOT=MPLOT.GE.0
       LSGNV=MSGNV.EQ.0
       IF(LPLOT) NET2=NET
       WRITE(6,200)
       WRITE(6,223)
       WRITE(6,302)
       DO 10 I=1,7
       U(2*I)=-U(2*I-1)
    10 H(2*I)=H(2*I-1)
       R=D/2.
       SPACE=D/(NET-1)
       DEG=PI/NET2
       PIH=PI/2.
       NN2=2*NN
```

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```
      READ(5,300) (HLP(I),I=1,NN)
      READ(5,301) (MAM(I),I=1,NN)
      READ(5,300) (RHOB(I),I=1,NN2)
      ISUM=0
      DO 15 I=1,NN
   15 ISUM=ISUM+MAM(I)
      READ(5,300) (RHO(I),I=1,ISUM)
      DO 14 I=1,ISUM
   14 RHO(I)=RHO(I)/R
      IF(LWL) READ(5,300) (PF(I),I=1,ISUM)
      WRITE(6,209) R
      IF(LWL) WRITE(6,219) WL
      IF(GDC.EQ.0.) GO TO 16
      WRITE(6,222) GDC
      WL=WL/GDC
   16 WRITE(6,216) EPSL
      WRITE(6,212) NN
      WRITE(6,213) ISUM
      IF(LSGNV) WRITE(6,227)
      WRITE(6,214) N,M
      WRITE(6,224)
      IF(LWL) WRITE(6,201)
      L1=1
      L2=0
      DO 17 K=1,NN
      WRITE(6,210) K,HLP(K),MAM(K),RHOB(2*K-1),RHOB(2*K)
      L2=MAM(K)+L2
      WRITE(6,225) (RHO(I),I=L1,L2)
      IF(LWL) WRITE(6,226) (PF(I),I=L1,L2)
   17 L1=L2+1
      DO 20 I=1,NN
      HLP(I)=HLP(I)/180.*PI+PIH
      C(I)=DSIN(HLP(I))
   20 S(I)=-DCOS(HLP(I))
      IF(LWL) GO TO 30
C TEST
      L1=0
      L2=0
      DO 22 K=1,NN
      L2=MAM(K)+L2
      DO 23 I=L1,L2
      XN=DABS((1.-RHO(I))*(1.+RHO(I)))
      XN=DSQRT(XN)
      SUM=0.
      DO 24 J=1,15
      X(J)=XN*U(J)
      XX=(X(J)*C(K)-RHO(I)*S(K))*R
      YY=(X(J)*S(K)+RHO(I)*C(K))*R
   24 SUM=SUM+TF(XX,YY)*H(J)
   23 PF(I)=SUM*XN*R
   22 L1=L2+1
C
   30 L1=0
      L2=0
      SUM=0.
      DO 31 K=1,NN
      L2=MAM(K)+L2
      DO 32 I=L1,L2
      THETA(I)=HLP(K)
      IF(RHO(I).GE.0.) GO TO 32
```

```
      RHO(I)=-RHO(I)
      THETA(I)=THETA(I)+PI
   32 SUM=SUM+PF(I)
   31 L1=L2+1
      SGN=1.
      IF(SUM.LT.O.) SGN=-1.
C
C MATRIX OF LEGENDRE POLYNOMIAL*HARMONICS
C
      M1=M+1
      MODN=N/2
      K=O
      MN=O
      DO 42 I1=1,ISUM
   42 RN2(I1)=RHO(I1)*RHO(I1)
C CALCULATION OF MATRIX OF LEGENDRE POLYNOMIAL
      DO 41 K1=1,N
      IF(K1.EQ.1) GO TO 49
      DO 43 I1=1,ISUM
      P(K1,I1)=1.O
      PT(K1,I1)=1.O
   43 CONTINUE
      G=1.O
      MD=MOD(K1,2)
      BA=O.5
      IF(MD.GT.O)BA=1.5
      MM=K1/2
      DO 44 I3=1,MM
      G=G*(MM+I3)/I3
      DO 44 I1=1,ISUM
      PT(K1,I1)=PT(K1,I1)*(-MM+I3-1.O)*(MM+BA+I3-1.O)*RN2(I1)/(I3*(BA+I3
     1-1.O))
      P(K1,I1)=P(K1,I1)+PT(K1,I1)
   44 CONTINUE
      DO 45 I1=1,ISUM
      IF(BA.EQ.O.5)GO TO 46
      P(K1,I1)=(-O.25)**MM*G*P(K1,I1)*(2.O*MM+1.O)*RHO(I1)
      GO TO 45
   46 P(K1,I1)=(-O.25)**MM*G*P(K1,I1)
   45 CONTINUE
      GO TO 41
   49 CONTINUE
      DO 41 I1=1,ISUM
      P(K1,I1)=RHO(I1)
   41 CONTINUE
C CALCULATION OF MN AND MNT
      DO 53 K21=1,M1
      MNK2=(N-K21+1)/2
   53 MN=MN+MNK2
      MNT=2*MN-MODN
      MNND=(MN-MODN)*ISUM
C CALCULATION OF MATRIX OF SIN AND COS(M*THETA(I2))
      DO 51 I2=1,ISUM
      DO 51 K21=1,M1
      K2=K21-1
      COST(I2,K21)=DCOS(K2*THETA(I2))
      SINT(I2,K21)=DSIN(K2*THETA(I2))
   51 CONTINUE
C CALCULATION OF COEFF. (COS OR SIN)*LEGENDRE POLYNOMIAL
      DO 47 I1=1,ISUM
```

```
      JMN=0
      K=K+1
      DO 48 K21=1,M1
      K22=K21+1
      LK21=K21.EQ.1
      DO 48 K4=K22,N,2
      K41=K4+1
      IJ=ISUM*JMN+K
      JMN=JMN+1
      IF(LK21) GO TO 50
      PP=P(K4,I1)-P(K21-1,I1)
      GO TO 56
   50 PP=P(K4,I1)-1.0
   56 WIJ(IJ)=COST(I1,K21)*PP
      IF(LK21) GO TO 48
      IJ=MNND+IJ
      WIJ(IJ)=SINT(I1,K21)*PP
   48 CONTINUE
   47 CONTINUE
C
C SOLUTION OF THE LINEAR ALGEBRAIC EQUATIONS BY
C LEAST SQUARE METHOD(WIJ*CXYL=PF'
      CALL DLLSQ(WIJ,PF,ISUM,MNT   ,CXYL,IPIV,EPSL,IER,AUX)
C
C OBJECT FUNCTION AT PRESCRIBED POINTS
      KY1=0
      ESUM=0.D0
      EMAX=0.D0
      PFM=0.D0
      DO 130 J=1,NET2
      IF(LPLOT) GO TO 135
      X(J)=(J-1)*DEG
      CO=DCOS(X(J))
      SI=DSIN(X(J))
      X(J)=X(J)/PI*180.D0
      GO TO 136
  135 X(J)=(J-1)*SPACE-R
      XN=X(J)
  136 DO 130 I=1,NET
      Y(I)=(I-1)*SPACE-R
      YN=Y(I)
      IF(LPLOT) GO TO 137
      XN=Y(I)*CO
      YN=Y(I)*SI
  137 TT=0.
      RR=YN*YN+XN*XN
      RR=DSQRT(RR)
      IF(RR.NE.0.) TT=DATAN2(YN,XN)
      KY2=0
      IF(RR.GE.R*0.99999999) GO TO 130
      DO 132 K=1,NN
      PROJ=YN*C(K)-XN*S(K)
      IF(RHOB(2*K-1).GE.PROJ.OR.RHOB(2*K).LE.PROJ) KY2=1
  132 CONTINUE
      IF(KY2.EQ.0) GO TO 130
      CALL DIFFUN(RR,TT,REF)
      OF(J,I)=REF
      IF(LSGNV.AND.REF*SGN.LT.0.) OF(J,I)=0.
      IF(LWL) OF(J,I)=OF(J,I)*WL
      AB=DABS(OF(J,I))
```

```
      IF(LWL) GO TO 131
C TEST
      F=TF(XN,YN)
      AB=DABS(F)
      OF(J,I)=OF(J,I)-F
      EAB=DABS(OF(J,I))
      IF(EAB.GT.EMAX) EMAX=EAB
      ESUM=ESUM+EAB
      KY1=KY1+1
C
  131 IF(AB.GT.PFM) PFM=AB
  130 CONTINUE
      IF(LWL) GO TO 150
C TEST
      DO 140 I=1,NET2
      DO 140 J=1,NET
      IF(OF(I,J).LT.1.D30) OF(I,J)=OF(I,J)/PFM*100.DO
  140 CONTINUE
      EAVR=ESUM/KY1/PFM*100.DO
      EMAX=EMAX/PFM*100.DO
      WRITE(6,203)
      WRITE(6,202) KY1,EMAX,EAVR
C
C OUTPUT
  150 WRITE(6,204) PFM
      NET1=NET+1
      NETM = NET - 1
      NE2=NET+2
      SCL2=1.DO
      CALL SCALE(SCL1,R)
      IF(LPLOT) GO TO 151
      WRITE(6,220) SCL1
      GO TO 152
  151 WRITE(6,215) SCL1
  152 IF(WL.EQ.O.DO) GO TO 161
      CALL SCALE(SCL2,PFM)
      WRITE(6,217) SCL2
  161 DO 162 I=1,NET
      IF(LPLOT) X(I)=X(I)*SCL1
      Y(I)=Y(I)*SCL1
      DO 162 K=1,NET2
      IF(OF(K,I).LT.1.D30) OF(K,I)=OF(K,I)*SCL2
  162 CONTINUE
      X(NET2+1)=1.5D30
      X(NET2+2)=1.5D30
      X(NET2+3)=1.5D30
      IF(MPLOT.LE.O) GO TO 160
      DO 164 I=1,NET
  164 V(I)=X(I)+DSIGN(5.D-1,X(I))
      WRITE(6,205) (V(I),I=1,NET)
      DO 166 I=1,NET
      V(1)=Y(NET1-I)+DSIGN(5.D-1,Y(NET1-I))
      DO 165 J=1,NE2
      IF(OF(J,NET1-I).GE.1.D30) OF(J,NET1-I)=30000.DO
  165 V(J+1)=OF(J,NET1-I)+DSIGN(5.D-1,OF(J,NET1-I))
      IF(NET.LE.30) GO TO 167
      WRITE(6,218) (V(J),J=1,NET1)
      GO TO 166
  167 WRITE(6,206) (V(J),J=1,NET1)
  166 CONTINUE
```

```
      GO TO 190
  160 IF(MPLOT.EQ.0) GO TO 171
      WRITE(6,221)
      GO TO 172
  171 WRITE(6,211)
  172 DO 170 I=1,NET2,4
      WRITE(6,207) X(I),Y(NET),OF(I,NET),X(I+1),Y(NET),OF(I+1,NET),
     1X(I+2),Y(NET),OF(I+2,NET),X(I+3),Y(NET),OF(I+3,NET)
  170 WRITE(6,208) (Y(NET-J),OF(I,NET-J),Y(NET-J),OF(I+1,NET-J),
     1Y(NET-J),OF(I+2,NET-J),Y(NET-J),OF(I+3,NET-J), J=1,NETM)
  190 STOP
C
  200 FORMAT(/T33,'RECONSTRUCTION FROM INCOMPLETE PROJECTIONS'/)
  201 FORMAT(1X,'PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF ',
     1'INTERFERENCE FRINGES')
  202 FORMAT(/T5,I4,2(20X,E11.4))
  203 FORMAT(/'NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE',
     1' ERRORS IN PERCENTS:'/)
  204 FORMAT(/'MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:',3X,E11.4)
  205 FORMAT(//'Y \ X:',30I4/7X,30I4/)
  206 FORMAT(/I5,2X,30I4)
  207 FORMAT(12F10.2)
  208 FORMAT(4(10X,2F10.2))
  209 FORMAT(/'ZERO OBJECT FIELD OUTSIDE THE RADIUS:',F14.6)
  210 FORMAT(/T5,I4,F10.2,5X,I4,10X,E11.4,2X,E11.4)
  211 FORMAT(/T8,3('X',9X,'Y',19X),'X',9X,'Y'/)
  212 FORMAT(/'NUMBER OF PROJECTIONS:',19X,I3)
  213 FORMAT(/'TOTAL NUMBER OF SAMPLING POINTS:',9X,I3)
  214 FORMAT(/'ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC',
     1' FUNCTIONS IN SERIES:',5X,2(I10))
  215 FORMAT(/'X AND Y COORDINATES MULTIPLIED BY:',5X,E10.3)
  216 FORMAT(/'TOLERANCE PARAMETER:',22X,E11.4)
  217 FORMAT(/'THE OBJECT FUNCTION MULTIPLIED BY:',5X,E10.3)
  218 FORMAT(/I5,2X,30I4/7X,31I4/)
  219 FORMAT(/'WAVELENGTH:',31X,E11.4)
  220 FORMAT(/'THE RADIUS R IS MULTIPLIED BY:',9X,E10.3)
  221 FORMAT(/T7,3('DEG',8X,'R',18X),'DEG',8X,'R'/)
  222 FORMAT(/'GLADSTONE-DALE CONSTANT:',18X,E11.4)
  223 FORMAT(T38,'(BY THE SERIES EXPANSION METHOD)'//)
  224 FORMAT(/'PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, ',
     1'BOUNDARIES OF OPAQUE OBSTACLE'/'RELATIVE POSITIONS OF ',
     2'INDIVIDUAL SAMPLING POINTS')
  225 FORMAT(2X,25(F5.2))
  226 FORMAT(1X,25(F5.1))
  227 FORMAT(/'NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED'/)
  300 FORMAT(100(9F12.5))
  301 FORMAT(36I3)
  302 FORMAT(' AN ARBITRARY TEXT UP TO 120 CHARACTERS EXCEPT THE FIRST C
     1HARACTER THAT HAS TO BE BLANK89 123456789 123456789 123456789 ')
      END
C
C
C
      SUBROUTINE DIFFUN(RR,TT,REF)
C THIS PROGRAN CALCULATES THE OBJECT FUNCTION
      IMPLICIT REAL*8(A-H,O-Z)
      DIMENSION COST(20),SINT(20),NM2(20,20),HNM2(20,20),
     1MPLS1(20,20),KF(20),MSIG(20),XX(20),XX1(20),SQRX(20),CXYL(100)
      LOGICAL LI4
      COMMON/SUB/R,CXYL,PI,MN,N,M
```

```
C
      MODN=N/2
      MODN1=MODN+1
      NP1=N+1
      MP1=M+1
      MP2=M+2
      KF(1)=1
      MSIG(1)=1
      PIR=PI*R
C
      DO 16 I4=1,MP1
      I=I4-1
      COST(I4)=DCOS(TT*I)
   16 SINT(I4)=DSIN(TT*I)
C
      DO 1 I=1,MODN
      NM2(I,1)=1
      HNM2(I,1)=1.0
      IP1=I+1
      DO 2 K=2,I
      NM2(I,K)=NM2(I,K-1)*(-I+K-2)
    2 CONTINUE
      DO 1 K=2,IP1
      HNM2(I,K)=HNM2(I,K-1)*(-I+0.5+K-2.0)
    1 CONTINUE
      DO 3 L=1,MP1
      MPLS1(L,1)=1
      KFI=(N-L+1)/2+1
      DO 3 K=2,KFI
      MPLS1(L,K)=MPLS1(L,K-1)*(L+K-2)
    3 CONTINUE
      DO 4 K=2,MODN
      KF(K)=KF(K-1)*(K-1)
      MSIG(K)=-MSIG(K-1)
    4 CONTINUE
C
      RDR=RR/R
      X=RDR*RDR
      X1=1-X
      DO 6 I2=1,MODN
      IF(I2.EQ.1)GO TO 9
      XX(I2)=(-X)*XX(I2-1)
      XX1(I2)=X1*XX1(I2-1)
      SQRX(I2)=RDR*SQRX(I2-1)
      GO TO 6
    9 XX(I2)=1.0
      XX1(I2)=1.0
      SQRX(I2)=1.0
    6 CONTINUE
      DO 17 I2=MODN1,MP2
      SQRX(I2)=RDR*SQRX(I2-1)
   17 CONTINUE
      PRSQ=DSQRT(X1)/PIR
C
      IC=0
      DO 7 I4=1,MP1
      LI4=I4 .EQ. 1
      REFC=0.0
      REFS=0.0
      REFRC=0.0
```

```
      REFRS=0.0
      I42=I4+2
      DO 10 I5=I42,NP1,2
      IC=IC+1
      ITR=(I5-I4)/2
      DO 8 I6=1,ITR
      IF(I6 .EQ. 1)GO TO 5
      CONST=NM2(ITR,I6)*HNM2(ITR,I6)/(DFLOAT(KF(I6))*DFLOAT(MPLS1(I4,I6)
     1))
      FMN=FMN+CONST*XX(I6)*XX1(ITR-I6+1)
      TFMN=TFMN+XX(I6)*MSIG(I6)
      GO TO 8
    5 FMN=XX1(ITR)
      TFMN=XX(1)
    8 CONTINUE
      CON=MPLS1(I4,ITR+1)/HNM2(ITR,ITR+1)
      FMN=FMN*CON-TFMN
      REFC=REFC+FMN*CXYL(IC)
      IF(LI4) GO TO 10
      REFS=REFS+FMN*CXYL(IC+MN-MODN)
   10 CONTINUE
      IF(LI4)GO TO 14
      REFW=REFC*COST(I4)+REFS*SINT(I4)
      REFWS=REFW*SQRX(I4)
      REF=REF+REFWS
      GO TO 7
   14 REF=REFC
    7 CONTINUE
      REF=REF*PRSQ
      RETURN
      END
C
C
      SUBROUTINE SCALE(SCL,Q)
      IMPLICIT REAL*8 (S,Q)
      SCL=1.DO
      IF(Q.LT.1.D-30) RETURN
    2 IF(Q.LT.999.5DO) GO TO 1
      Q=Q/10.DO
      SCL=SCL/10.DO
      GO TO 2
    1 IF(Q.GE.99.5DO) RETURN
      Q=Q*10.DO
      SCL=SCL*10.DO
      GO TO 1
      END
C
C
      FUNCTION TF(DX,DY)
      IMPLICIT REAL*8 (A-H,O-Z)
      TF=0.DO
      FD=1.DO-(DX*DX+DY*DY)
      IF(FD.LT.1.D-9) GO TO 2
      F1=DY*DY+(DX-0.6DO)*(DX-0.6DO)
      F2=DY*DY+(DX+0.6DO)*(DX+0.6DO)
      F3=DX*DX+(DY-0.6DO)*(DY-0.6DO)
      F4=DX*DX+(DY+0.6DO)*(DY+0.6DO)
      F1=DEXP(-6.DO*F1/FD)
      F2=0.5DO*DEXP(-6.DO*F2/FD)
      F3=DEXP(-6.DO*F3/FD)
```

```
      F4=0.5DO*DEXP(-6.DO*F4/FD)
      TF=F1+F2+F3+F4
    2 RETURN
      END
End of file
```

```
TEST - TRIANGUAL OPAQUE OBJECT TB. TEST FUNCTION NO2
1.1.0.27.20.30.4.2..0..0.
5.6.5.5.5.5.5.5.5.5.5.5.5.5.6.6.6.6.6.6.6.6.7.6.6.7.6.8.6.8.5.9.5.10.5.10.5.9.5.9.5.8.5.7.6.7.6.6.6.6.6.6.6.6.
End of file
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

TEST - TRIANGUAL OPAQUE OBJECT TB, TEST FUNCTION NO2

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 1.000000

INTERPOLATION COEFFICIENT: 0

NUMBER OF PROJECTIONS: 27 NUMBER OF RAYS IN EACH PROJECTION: 20

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1	0.2984E-01	0.1581E-01
2	0.1596E-01	0.1102E-01
3	0.1261E-01	0.9524E-02
4	0.1148E-01	0.9041E-02
5	0.1106E-01	0.8942E-02
6	0.1101E-01	0.9037E-02

RESULT IS FROM ITERATION: 6
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 38.7

NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE ERRORS IN PERCENTS:

572	0.2261E+02	0.3832E+01

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.9903E+00

X AND Y COORDINATES MULTIPLIED BY: 0.100E+03

Y \ X:	-100	-93	-86	-79	-72	-66	-59	-52	-45	-38	-31	-24	-17	-10	-3	3	10	17	24	31	38	45	52	59	66	72	79	86	93	100
100	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
93	*	*	*	*	*	*	*	*	*	*	-1	0	-1	-3	3	3	-4	3	6	-6	*	*	*	*	*	*	*	*	*	*
86	*	*	*	*	*	*	*	*	0	0	1	3	1	-1	4	2	-2	9	6	-7	0	3	*	*	*	*	*	*	*	*
79	*	*	*	*	*	*	-1	-1	0	3	4	3	-4	-7	-2	-6	-5	6	3	-3	4	3	-2	1	*	*	*	*	*	*
72	*	*	*	*	*	-2	-2	-1	0	1	2	0	-6	-8	-4	-8	-7	1	-3	-3	5	4	1	3	1	*	*	*	*	*
66	*	*	*	*	5	4	1	-2	-3	-2	0	1	-4	-8	-6	-10	-8	0	-3	0	6	2	1	2	-1	-3	*	*	*	*
59	*	*	*	-6	-1	4	7	5	1	-5	-4	-2	-5	-6	-6	-9	-7	-3	-2	3	4	2	2	0	0	2	4	*	*	*

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  52 ************   1  -4  -5   1   9   8   4  -3  -6 -10 -10 -13 -11  -6  -7  -4   5   6   3   6   4   3   4   3************
  45 ********   2   7   4  -1  -5  -2   4  11   7  -3******************  -6  -2   9  11   8   5   4   2   4   2   1********
  38 ********  -3   3   7   9   4  -2  -4   2  10   3  -3**********************  17  16  11   5   4   6   7   7   4********
  31 ****   1  -1  -2  -2   3   8   6   0  -2   1   1   2*****************************  13   7   6   7   4   4   0  -2****
  24 ****  -1   3   1  -3  -5   3   2   6   3   0  -1   3*********************************   3   4   3  -2   0  -1  -4****
  17 ****   5   7   6   3   1  -2   1   5   7   5   2   0*****************************   2  -3  -3  -2  -2   1   6   3****
  10 ****  -1  -2  -6  -5  -1   2   3   1   1   0   0  -1   0*************************  -8 -14 -18 -17 -15 -10  -2  -3****
   3 ****  -5  -3  -6  -5  -3   0  -1  -4  -6  -6  -4  -1   1************************* -16 -19 -21 -23 -20 -16  -8  -6****
  -3 ****   9  11   9   8   6   3  -1  -3  -4  -2   0   1   6*********************  -1 -10 -11  -9  -8  -4   0   7   8****
 -10 ****   3   4   1  -1  -3  -5  -6  -6  -5  -3  -4  -5  -1   4*****************  -9  -1   1  -3  -8  -5  -1   5   2****
 -17 ****  -6  -5  -7  -9 -10 -11 -10  -7  -4  -4  -7  -8  -4  -3****************** -18   0   7   5  -4 -11 -10  -5  -5****
 -24 ****   2   3   1  -2  -3  -4  -2   1   1  -2  -3  -1   4   6   5**************  -9  -3   4  11  14   8   4   1   1****
 -31 ****   1   0   0  -1  -2  -1   2   3   1  -1   0   3   4   6   3***********  -7   6   1  -3   0   8  13  14   5  -1****
 -38 ********  -5  -3  -2   0   1   3   4   0  -1   0   0   1   4  -3  -9*******   3   4   7   2  -4  -6  -1   4   7********
 -45 ********   0   2   3   2   4   2   2  -2  -5  -1   1   3   5  -3  -8****   8   3  -4   0   4   6  -1  -3  -5  -1********
 -52 ************   0  -1   0   0   0  -1  -4  -4   2   3   3   5  -2  -5   0   4   4  -3  -5   1   3   5   3  -1***********
 -59 ************  -3  -1   1  -1   0   2  -3   0   6   1   1   1  -5  -6  -2   2   3   0   0  -1  -2   1   2   3************
 -66 ****************   2   2   0   1   0  -2   3   5  -2  -1  -1  -7  -4   0   2   2   0  -2   1   2   0  -2****************
 -72 ********************   0  -1   1   0  -2   5   3  -6   0   0  -7  -3   0   1   3   0  -3   0   2   2********************
 -79 ************************   0   2  -2   0   7   1  -4   3  -1  -7  -1   2   2   4   1  -2  -3  -1************************
 -86 ****************************  -3   0   7  -1   0   8   1  -3   4   3   1   2   0  -1****************************
 -93 ********************************   4  -4   0   8  -1  -2   5   1   0   2********************************
-100 ****************************************************************************************************
```

```
 TEST - TRIANGULAR OPAQUE OBJECT TB, TEST FUNCTION NO2
 &NAM D=2.,WL=0.,GDC=0.,MSGNV=1,EPSL=10.E-5,NN=27,N=12,M=12,MPLOT=1,NET=30,NET2=24 &END
0.,6.7,13.3,20.,26.7,33.3,40.,46.7,53.3,60.,66.7,73.3,80.,86.7,93.3,100.,106.7,113.3,120.,126.7,133.3,140.,146.7,153.3,160.,166.7.
11,10,10,10,10,10,10,12,12,12,12,13,13,14,14,14,15,15,14,14,13,12,13,12,12,12,12,
-.58,.47,-.58,.58 -.58,.58,-.58,.58,-.58,.58,-.58,.58,-.58,.58,-.47,.47,-.47,.47,-.47,.47,-.47,.47,-.37,.47,-.47,.37,-.47,.26,-.47
-1.,-.89,-.79,-.68,-.58,.47,.58,.68,.79,.89,1.,-1.,-.89,-.79,-.68,-.58,.58,.68,.79,.89,1.,-1.,-.89,-.79,-.68,-.58,.58,.68,.79,.89,
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                              RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

                                  (BY THE SERIES EXPANSION METHOD)

TEST - TRIANGULAR OPAQUE OBJECT TB. TEST FUNCTION NO2

ZERO OBJECT FIELD OUTSIDE THE RADIUS:        1.000000

TOLERANCE PARAMETER:                         0.1000E-03

NUMBER OF PROJECTIONS:                      27

TOTAL NUMBER OF SAMPLING POINTS:           331

ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:            12          12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS

      1       0.0         11             -0.5800E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58 0.47 0.58 0.68 0.79 0.89 1.00

      2       6.70        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      3      13.30        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      4      20.00        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      5      26.70        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      6      33.30        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      7      40.00        10             -0.5800E+00    0.5800E+00
 -1.00-0.89-0.79-0.68-0.58 0.58 0.68 0.79 0.89 1.00

      8      46.70        12             -0.4700E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

      9      53.30        12             -0.4700E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

     10      60.00        12             -0.4700E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

     11      66.70        12             -0.4700E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

     12      73.30        13             -0.3700E+00    0.4700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47-0.37 0.47 0.58 0.68 0.79 0.89 1.00

     13      80.00        13             -0.4700E+00    0.3700E+00
 -1.00-0.89-0.79-0.68-0.58-0.47 0.37 0.47 0.58 0.68 0.79 0.89 1.00
```

```
   14     86.70       14             -0.4700E+00   0.2600E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   15     93.30       14             -0.4700E+00   0.2600E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   16    100.00       14             -0.5800E+00   0.1600E+00
-1.00-0.89-0.79-0.68-0.58 0.16 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   17    106.70       15             -0.5800E+00   0.5000E-01
-1.00-0.89-0.79-0.68-0.58 0.05 0.16 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   18    113.30       15             -0.5800E+00   0.5000E-01
-1.00-0.89-0.79-0.68-0.58 0.05 0.16 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   19    120.00       14             -0.5800E+00   0.1600E+00
-1.00-0.89-0.79-0.68-0.58 0.16 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   20    126.70       14             -0.5800E+00   0.1600E+00
-1.00-0.89-0.79-0.68-0.58 0.16 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   21    133.30       13             -0.5800E+00   0.2600E+00
-1.00-0.89-0.79-0.68-0.58 0.26 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   22    140.00       12             -0.5800E+00   0.3700E+00
-1.00-0.89-0.79-0.68-0.58 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   23    146.70       13             -0.4700E+00   0.3700E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.37 0.47 0.58 0.68 0.79 0.89 1.00

   24    153.30       12             -0.4700E+00   0.4700E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

   25    160.00       12             -0.4700E+00   0.4700E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

   26    166.70       12             -0.4700E+00   0.4700E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

   27    173.30       12             -0.4700E+00   0.4700E+00
-1.00-0.89-0.79-0.68-0.58-0.47 0.47 0.58 0.68 0.79 0.89 1.00

NUMBER OF OBJECT POINTS, MAXIMUM AND AVERAGE ABSOLUTE ERRORS IN PERCENTS:

   572                  0.5493E+02                 0.8352E+01

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.9903E+00

X AND Y COORDINATES MULTIPLIED BY:      0.100E+03

Y \ X:-100 -93 -86 -79 -72 -66 -59 -52 -45 -38 -31 -24 -17 -10  -3   3  10  17  24  31  38  45  52  59  66  72  79  86  93 100

 100  ************************************************************************************************************************
  93  ****************************************  55  36  18   8   4   3   5   9  14  17*****************************************
  86  ********************************  51  20  -4 -14 -16 -16 -15 -13 -11  -8  -6  -2   4  11*********************************
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79						45	23	-6	-18	-17	-12	-9	-8	-9	-10	-10	-10	-9	-9	-8	-3	6	-1					
72					36	8	-13	-18	-11	-1	5	7	5	1	-4	-7	-9	-9	-9	-10	-10	-5	5	14				
66				28	4	-12	-13	-5	5	12	15	13	8	2	-4	-9	-10	-10	-8	-8	-9	-9	-5	6	17			
59			22	6	-8	-9	-2	6	11	13	11	7	1	-5	-11	-14	-14	-11	-7	-3	-2	-5	-7	-4	8	18		
52			10	-5	-7	-2	3	6	6	4	1	-4	-9	-14	-18	-19	-17	-12	-5	2	5	4	-2	-6	-3	12		
45		14	-2	-6	-3	0	1	0	-2	-5	-8						-21	-14	-6	4	11	12	7	-1	-6	0	17	
38		3	-6	-5	-3	-2	-4	-6	-9	-10	-11	-13							-9	1	11	15	13	5	-3	-5	5	
31	8	-4	-7	-5	-4	-5	-7	-9	-10	-10	-9	-10									4	11	12	8	0	-5	-2	10
24	2	-6	-6	-5	-5	-6	-7	-8	-7	-6	-5	-5										2	6	5	0	-3	-3	4
17	-2	-5	-5	-5	-4	-4	-4	-4	-3	-2	-2	-4									-18	-9	-3	-1	-3	-3	-2	-1
10	-3	-2	-3	-3	-2	-1	0	0	0	-1	-3	-6	-11								-26	-18	-11	-8	-7	-5	-1	-2
3	-2	0	-1	-1	1	2	2	1	-1	-3	-7	-11	-16								-28	-21	-15	-12	-9	-6	-1	-1
-3	-2	3	2	1	2	3	3	1	-3	-8	-12	-16	-19							-25	-21	-17	-14	-11	-9	-5	1	-1
-10	-3	5	4	2	2	2	1	-2	-6	-11	-15	-18	-19	-17						-9	-9	-9	-8	-7	-5	-2	2	-2
-17	-5	5	5	2	0	-1	-2	-4	-8	-12	-15	-15	-12	-7						9	5	3	0	0	0	3	3	-3
-24	-10	3	5	1	-2	-4	-4	-5	-7	-9	-9	-7	-2	6	15					22	17	11	7	6	5	5	1	-2
-31	-13	-2	4	1	-4	-6	-6	-5	-5	-4	-1	3	10	19	27				34	28	21	15	11	9	8	5	-1	1
-38		-8	2	2	-3	-6	-6	-4	-1	3	7	12	19	26	32	36			29	23	16	12	10	9	7	2	-1	
-45		-16	-1	4	0	-4	-5	-2	2	7	12	17	22	26	28	28		20	15	10	7	6	7	7	5	0	0	
-52			-9	4	5	2	0	1	4	8	13	16	18	18	15	11	6	1	-3	-4	-2	2	5	6	3	-2		
-59			-19	-3	8	8	6	5	6	8	10	11	9	6	1	-5	-10	-14	-14	-10	-4	3	7	5	-2	-6		
-66				-19	0	10	11	10	9	8	8	6	2	-3	-8	-13	-16	-15	-11	-4	4	9	7	-3	-13			
-72					-18	-1	9	12	11	10	8	5	1	-3	-6	-8	-6	-2	4	10	12	7	-6	-20				
-79						-17	-6	4	8	10	9	8	7	5	6	8	11	15	16	12	1	-16	-26					
-86								-13	-5	0	4	6	8	10	12	14	14	9	-1	-16	-32							
-93										-14	-14	-12	-10	-9	-9	-13	-20	-30	-37									
-100																												

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
1,0.2,18,15,30,36.7,.5.32E-5,2.27E-4,
8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,
0.0,0.1,0.5,1.0,1.6,2.2,2.6,2.8
2.8,2.6,2.2,1.6,1.0,0.5,0.1,0.0
0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0
3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0
0.0,0.1,0.3,0.6,1.2,1.9,2.7,3.0
3.0,2.8,2.2,1.5,0.8,0.3,0.1,0.0
0.0,0.1,0.3,0.7,1.2,1.9,2.7,2.9
2.9,2.7,2.1,1.4,0.9,0.5,0.2,0.0
0.0,.05,0.2,0.7,1.3,2.1,2.5,2.6
2.6,2.3,1.7,1.0,0.5,0.2,.05,0.0
0.0,0.0,.02,0.3,1.0,1.9,2.5,2.7
2.7,2.6,2.2,1.5,0.9,0.4,0.1,0.0
0.0,.15,0.4,0.8,1.3,1.7,2.4,2.7
2.7,2.4,1.6,1.0,0.5,0.2,0.1,0.0
0.0,0.0,0.2,0.6,1.1,1.7,2.5,2.7
2.7,2.5,2.0,1.5,1.1,0.6,0.3,0.0
0.0,0.0,0.2,0.5,1.0,1.8,2.6,2.8
2.8,2.7,2.15,1.4,1.0,0.5,.15,0.0
0.0,0.1,0.5,1.0,1.5,2.2,2.6,2.75
2.75,2.6,2.1,1.4,0.8,0.4,0.1,0.0
0.0,0.0,0.2,0.5,1.0,1.8,2.6,2.8
2.8,2.7,2.15,1.4,1.0,0.5,.15,0.0
0.0,0.0,0.2,0.6,1.1,1.7,2.5,2.7
2.7,2.5,2.0,1.6,1.1,0.6,0.3,0.0
0.0,.15,0.4,0.8,1.3,1.7,2.4,2.7
2.7,2.4,1.6,1.0,0.5,0.2,0.1,0.0
0.0,0.0,.02,0.3,1.0,1.9,2.5,2.7
2.7,2.6,2.2,1.5,0.9,0.4,0.1,0.0
0.0,.05,0.2,0.7,1.3,2.1,2.5,2.6
2.6,2.3,1.7,1.0,0.5,0.2,.05,0.0
0.0,0.1,0.3,0.7,1.2,1.9,2.7,2.9
2.9,2.7,2.1,1.4,0.9,0.5,0.2,0.0
0.0,0.1,0.3,0.6,1.2,1.9,2.7,3.0
3.0,2.8,2.2,1.5,0.8,0.3,0.1,0.0
0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0
3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0


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ORIGINAL PAGE IS
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 3.500000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 15

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	0.1	0.5	1.0	1.6	2.2	2.6	2.8	2.6	2.2	1.6	1.0	0.5	0.1	0.0
2	0.0	0.1	0.3	0.9	1.4	2.1	2.7	2.9	2.7	2.2	1.6	1.0	0.6	0.1	0.0
3	0.0	0.1	0.3	0.8	1.3	2.1	2.8	3.0	2.8	2.1	1.3	0.8	0.4	0.1	0.0
4	0.0	0.1	0.3	0.7	1.3	2.0	2.8	3.0	2.8	2.1	1.2	0.6	0.2	0.1	0.0
5	0.0	0.1	0.3	0.6	1.2	1.9	2.7	3.0	2.8	2.2	1.5	0.8	0.3	0.1	0.0
6	0.0	0.1	0.3	0.6	1.1	1.8	2.7	3.0	2.8	2.3	1.7	1.0	0.5	0.2	0.0
7	0.0	0.1	0.3	0.7	1.2	1.9	2.7	2.9	2.7	2.1	1.4	0.9	0.5	0.2	0.0
8	0.0	0.1	0.3	0.8	1.3	2.0	2.6	2.7	2.5	1.7	1.0	0.6	0.3	0.1	0.0
9	0.0	0.1	0.2	0.7	1.3	2.1	2.5	2.6	2.3	1.7	1.0	0.5	0.2	0.1	0.0
10	0.0	-0.0	0.0	0.4	1.1	2.0	2.5	2.6	2.4	2.0	1.4	0.8	0.3	0.1	0.0
11	0.0	0.0	0.0	0.3	1.0	1.9	2.5	2.7	2.6	2.2	1.5	0.9	0.4	0.1	0.0
12	0.0	0.1	0.2	0.5	1.1	1.8	2.5	2.8	2.6	1.9	1.2	0.7	0.3	0.1	0.0
13	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.4	1.6	1.0	0.5	0.2	0.1	0.0
14	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.3	1.7	1.3	0.7	0.4	0.2	0.0
15	0.0	0.0	0.2	0.6	1.1	1.7	2.5	2.7	2.5	2.0	1.6	1.1	0.6	0.3	0.0
16	0.0	-0.0	0.1	0.4	0.9	1.7	2.6	2.8	2.7	2.2	1.6	1.2	0.6	0.3	0.0
17	0.0	0.0	0.2	0.5	1.0	1.8	2.6	2.8	2.7	2.1	1.4	1.0	0.5	0.1	0.0
18	0.0	0.1	0.4	0.8	1.3	2.1	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
19	0.0	0.1	0.5	1.0	1.5	2.2	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
20	0.0	0.1	0.4	0.8	1.3	2.1	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
21	0.0	0.0	0.2	0.5	1.0	1.8	2.6	2.8	2.7	2.1	1.4	1.0	0.5	0.1	0.0
22	0.0	-0.0	0.1	0.4	0.9	1.7	2.6	2.8	2.7	2.2	1.6	1.2	0.6	0.3	0.0
23	0.0	0.0	0.2	0.6	1.1	1.7	2.5	2.7	2.5	2.0	1.6	1.1	0.6	0.3	0.0
24	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.3	1.7	1.3	0.7	0.4	0.2	0.0
25	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.4	1.6	1.0	0.5	0.2	0.1	0.0
26	0.0	0.1	0.2	0.5	1.1	1.8	2.5	2.8	2.6	1.9	1.2	0.7	0.3	0.1	0.0
27	0.0	0.0	0.0	0.3	1.0	1.9	2.5	2.7	2.6	2.2	1.5	0.9	0.4	0.1	0.0
28	0.0	-0.0	0.0	0.4	1.1	2.0	2.5	2.6	2.4	2.0	1.4	0.8	0.3	0.1	0.0
29	0.0	0.1	0.2	0.7	1.3	2.1	2.5	2.6	2.3	1.7	1.0	0.5	0.2	0.1	0.0
30	0.0	0.1	0.3	0.8	1.3	2.0	2.6	2.7	2.5	1.7	1.0	0.6	0.3	0.1	0.0
31	0.0	0.1	0.3	0.7	1.2	1.9	2.7	2.9	2.7	2.1	1.4	0.9	0.5	0.2	0.0
32	0.0	0.1	0.3	0.6	1.1	1.8	2.7	3.0	2.8	2.3	1.7	1.0	0.5	0.2	0.0
33	0.0	0.1	0.3	0.6	1.2	1.9	2.7	3.0	2.8	2.2	1.5	0.8	0.3	0.1	0.0
34	0.0	0.1	0.3	0.7	1.3	2.0	2.8	3.0	2.8	2.1	1.2	0.6	0.2	0.1	0.0
35	0.0	0.1	0.3	0.8	1.3	2.1	2.8	3.0	2.8	2.1	1.3	0.8	0.4	0.1	0.0

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OF POOR QUALITY

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 36      0.0  0.1  0.3  0.9  1.4  2.1  2.7  2.9  2.7  2.2  1.6  1.0  0.6  0.1  0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

     1                     0.3791E-02                0.1448E+00

RESULT IS FROM ITERATION:   1
MISSING PART OF THE PROJECTION DATA IN PERCENTS:        0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.2066E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X: -350-326-302-278-253-229-205-181-157-133-109 -84 -60 -36 -12  12  36  60  84 109 133 157 181 205 229 253 278 302 326 350

 350  ************************************************************************************************************************
 326  ****************************************    3   1   1   2   0   0   0   0   0   2****************************************
 302  ********************************    7   8   7   6   6   6   4   0   0   0   3   6   6   3********************************
 278  ************************    0   5  10  14  13  13  14  14  11   7   5   6   9  12  11   7   2   0************************
 253  ********************    3   6  10  17  21  23  24  24  22  20  18  16  17  18  18  15  10   6   3   0********************
 229  ****************    6   9  10  15  23  29  34  38  38  35  32  31  30  30  30  26  20  13   8   6   3   1****************
 205  ************    5  11  13  13  18  27  35  44  52  54  51  48  46  45  47  44  37  27  17  12   9   6   4   3************
 181  ************   10  16  18  19  25  35  43  53  63  67  68  67  65  62  61  58  49  36  25  17  14  12  10   9************
 157  ********    6  14  22  26  28  36  46  55  66  75  80  85  90  88  81  76  72  62  46  33  24  18  16  16  14  12********
 133  ********    9  18  27  33  38  46  57  70  83  92 100 108 115 116 106  96  88  76  58  43  32  26  22  19  16  11********
 109  ****    5  11  20  29  39  48  56  67  84 101 [illegible] 125 135 140 141 134 121 109  92  71  53  42  36  30  22  14   8   4****
  84  ****    5  12  20  31  44  57  66  76  94 117 135 150 161 166 166 160 145 128 107  82  63  53  46  37  25  12   3   0****
  60  ****    6  13  21  31  46  61  73  84 103 128 149 169 183 189 190 185 168 144 119  93  73  62  51  38  24  10   0   0****
  36  ****    8  13  21  31  47  63  79  92 112 136 160 182 196 199 201 202 186 159 131 105  85  69  52  35  20   8   0   0****
  12  ****   10  14  21  33  49  67  83  99 119 140 166 188 199 205 207 205 195 167 137 116  95  75  52  33  18   6   0   0****
 -12  ****   10  14  21  33  49  67  83  99 119 140 166 188 199 205 207 205 195 167 137 116  95  75  52  33  18   6   0   0****
 -36  ****    8  13  21  31  47  63  79  92 112 136 160 182 196 199 201 202 186 159 131 105  85  69  52  35  20   8   0   0****
 -60  ****    6  13  21  31  46  61  73  84 103 128 149 169 183 189 190 185 168 144 119  93  73  62  51  38  24  10   0   0****
 -84  ****    5  12  20  31  44  57  66  76  94 117 135 150 161 166 166 160 145 128 107  82  63  53  46  37  25  12   3   0****
-109  ****    5  11  20  29  39  48  56  67  84 101 115 125 135 140 141 134 121 109  92  71  53  42  36  30  22  14   8   4****
```

-133	********	9	18	27	33	38	46	57	70	83	92	100	108	115	116	106	96	88	76	58	43	32	26	22	19	16	11********
-157	********	6	14	22	26	28	36	46	55	66	75	80	85	90	88	81	76	72	62	46	33	24	18	16	16	14	12********
-181	****	****	10	16	18	19	25	35	43	53	63	67	68	67	65	62	61	58	49	36	25	17	14	12	10	9****	****
-205	****	****	5	11	13	13	18	27	35	44	52	54	51	48	46	45	47	44	37	27	17	12	9	6	4	3****	****
-229	****	****	****	6	9	10	15	23	29	34	38	38	35	32	31	30	30	30	26	20	13	8	6	3	1****	****	****
-253	****	****	****	****	3	6	10	17	21	23	24	24	22	20	18	16	17	18	18	15	10	6	3	0****	****	****	****
-278	****	****	****	****	****	0	5	10	14	13	13	14	14	11	7	5	6	9	12	11	7	2	0****	****	****	****	****
-302	****	****	****	****	****	****	****	7	8	7	6	6	6	4	0	0	0	3	6	6	3****	****	****	****	****	****	****
-326	****	****	****	****	****	****	****	****	****	3	1	1	2	0	0	0	0	0	2****	****	****	****	****	****	****	****	****
-350	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
-1,0,2,18,15,15,36,7.,5.32E-5,2.27E-4,
8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,
0.0,0.1,0.5,1.0,1.6,2.2,2.6,2.8
2.8,2.6,2.2,1.6,1.0,0.5,0.1,0.0
0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0
3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0
0.0,0.1,0.3,0.6,1.2,1.9,2.7,3.0
3.0,2.8,2.2,1.5,0.8,0.3,0.1,0.0
0.0,0.1,0.3,0.7,1.2,1.9,2.7,2.9
2.9,2.7,2.1,1.4,0.9,0.5,0.2,0.0
0.0,.05,0.2,0.7,1.3,2.1,2.5,2.6
2.6,2.3,1.7,1.0,0.5,0.2,.05,0.0
0.0,0.0,.02,0.3,1.0,1.9,2.5,2.7
2.7,2.6,2.2,1.5,0.9,0.4,0.1,0.0
0.0,.15,0.4,0.8,1.3,1.7,2.4,2.7
2.7,2.4,1.6,1.0,0.5,0.2,0.1,0.0
0.0,0.0,0.2,0.6,1.1,1.7,2.5,2.7
2.7,2.5,2.0,1.6,1.1,0.6,0.3,0.0
0.0,0.0,0.2,0.5,1.0,1.8,2.6,2.8
2.8,2.7,2.15,1.4,1.0,0.5,.15,0.0
0.0,0.1,0.5,1.0,1.5,2.2,2.6,2.75
2.75,2.6,2.1,1.4,0.8,0.4,0.1,0.0
0.0,0.0,0.2,0.5,1.0,1.8,2.6,2.8
2.8,2.7,2.15,1.4,1.0,0.5,.15,0.0
0.0,0.0,0.2,0.6,1.1,1.7,2.5,2.7
2.7,2.5,2.0,1.6,1.1,0.6,0.3,0.0
0.0,.15,0.4,0.8,1.3,1.7,2.4,2.7
2.7,2.4,1.6,1.0,0.5,0.2,0.1,0.0
0.0,0.0,.02,0.3,1.0,1.9,2.5,2.7
2.7,2.6,2.2,1.5,0.9,0.4,0.1,0.0
0.0,.05,0.2,0.7,1.3,2.1,2.5,2.6
2.6,2.3,1.7,1.0,0.5,0.2,.05,0.0
0.0,0.1,0.3,0.7,1.2,1.9,2.7,2.9
2.9,2.7,2.1,1.4,0.9,0.5,0.2,0.0
0.0,0.1,0.3,0.6,1.2,1.9,2.7,3.0
3.0,2.8,2.2,1.5,0.8,0.3,0.1,0.0
0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0
3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0
End of file
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 3.500000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 15

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	0.1	0.5	1.0	1.6	2.2	2.6	2.8	2.6	2.2	1.6	1.0	0.5	0.1	0.0
2	0.0	0.1	0.3	0.9	1.4	2.1	2.7	2.9	2.7	2.2	1.6	1.0	0.6	0.1	0.0
3	0.0	0.1	0.3	0.8	1.3	2.1	2.8	3.0	2.8	2.1	1.3	0.8	0.4	0.1	0.0
4	0.0	0.1	0.3	0.7	1.3	2.0	2.8	3.0	2.8	2.1	1.2	0.6	0.2	0.1	0.0
5	0.0	0.1	0.3	0.6	1.2	1.9	2.7	3.0	2.8	2.2	1.5	0.8	0.3	0.1	0.0
6	0.0	0.1	0.3	0.6	1.1	1.8	2.7	3.0	2.8	2.3	1.7	1.0	0.5	0.2	0.0
7	0.0	0.1	0.3	0.7	1.2	1.9	2.7	2.9	2.7	2.1	1.4	0.9	0.5	0.2	0.0
8	0.0	0.1	0.3	0.8	1.3	2.0	2.6	2.7	2.5	1.7	1.0	0.6	0.3	0.1	0.0
9	0.0	0.1	0.2	0.7	1.3	2.1	2.5	2.6	2.3	1.7	1.0	0.5	0.2	0.1	0.0
10	0.0	-0.0	0.0	0.4	1.1	2.0	2.5	2.6	2.4	2.0	1.4	0.8	0.3	0.1	0.0
11	0.0	0.0	0.0	0.3	1.0	1.9	2.5	2.7	2.6	2.2	1.5	0.9	0.4	0.1	0.0
12	0.0	0.1	0.2	0.5	1.1	1.8	2.5	2.8	2.6	1.9	1.2	0.7	0.3	0.1	0.0
13	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.4	1.6	1.0	0.5	0.2	0.1	0.0
14	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.3	1.7	1.3	0.7	0.4	0.2	0.0
15	0.0	0.0	0.2	0.6	1.1	1.7	2.5	2.7	2.5	2.0	1.6	1.1	0.6	0.3	0.0
16	0.0	-0.0	0.1	0.4	0.9	1.7	2.6	2.8	2.7	2.2	1.6	1.2	0.6	0.3	0.0
17	0.0	0.0	0.2	0.5	1.0	1.8	2.6	2.8	2.7	2.1	1.4	1.0	0.5	0.1	0.0
18	0.0	0.1	0.4	0.8	1.3	2.1	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
19	0.0	0.1	0.5	1.0	1.5	2.2	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
20	0.0	0.1	0.4	0.8	1.3	2.1	2.6	2.8	2.6	2.1	1.4	0.8	0.4	0.1	0.0
21	0.0	0.0	0.2	0.5	1.0	1.8	2.6	2.8	2.7	2.1	1.4	1.0	0.5	0.1	0.0
22	0.0	-0.0	0.1	0.4	0.9	1.7	2.6	2.8	2.7	2.2	1.6	1.2	0.6	0.3	0.0
23	0.0	0.0	0.2	0.6	1.1	1.7	2.5	2.7	2.5	2.0	1.6	1.1	0.6	0.3	0.0
24	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.3	1.7	1.3	0.7	0.4	0.2	0.0
25	0.0	0.1	0.4	0.8	1.3	1.7	2.4	2.7	2.4	1.6	1.0	0.5	0.2	0.1	0.0
26	0.0	0.1	0.2	0.5	1.1	1.8	2.5	2.8	2.6	1.9	1.2	0.7	0.3	0.1	0.0
27	0.0	0.0	0.0	0.3	1.0	1.9	2.5	2.7	2.6	2.2	1.5	0.9	0.4	0.1	0.0
28	0.0	-0.0	0.0	0.4	1.1	2.0	2.5	2.6	2.4	2.0	1.4	0.8	0.3	0.1	0.0
29	0.0	0.1	0.2	0.7	1.3	2.1	2.5	2.6	2.3	1.7	1.0	0.5	0.2	0.1	0.0
30	0.0	0.1	0.3	0.8	1.3	2.0	2.6	2.7	2.5	1.7	1.0	0.6	0.3	0.1	0.0
31	0.0	0.1	0.3	0.7	1.2	1.9	2.7	2.9	2.7	2.1	1.4	0.9	0.5	0.2	0.0
32	0.0	0.1	0.3	0.6	1.1	1.8	2.7	3.0	2.8	2.3	1.7	1.0	0.5	0.2	0.0
33	0.0	0.1	0.3	0.6	1.2	1.9	2.7	3.0	2.8	2.2	1.5	0.8	0.3	0.1	0.0
34	0.0	0.1	0.3	0.7	1.3	2.0	2.8	3.0	2.8	2.1	1.2	0.6	0.2	0.1	[illegible]
35	0.0	0.1	0.3	0.8	1.3	2.1	2.8	3.0	2.8	2.1	1.3	0.8	0.4	0.1	0.0

A45

36 0.0 0.1 0.3 0.9 1.4 2.1 2.7 2.9 2.7 2.2 1.6 1.0 0.6 0.1 0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1 0.3791E-02 0.1448E+00

RESULT IS FROM ITERATION: 1
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2090E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	350.00	**********	5.00	350.00	**********	10.00	350.00	**********	15.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.99		300.00	5.66
	250.00	19.41		250.00	21.13		250.00	25.87		250.00	31.47
	200.00	57.17		200.00	57.60		200.00	58.41		200.00	58.36
	150.00	101.82		150.00	100.37		150.00	96.01		150.00	92.17
	100.00	148.80		100.00	148.33		100.00	147.48		100.00	147.09
	50.00	204.44		50.00	204.35		50.00	204.16		50.00	203.98
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	196.47		-50.00	196.41		-50.00	196.31		-50.00	196.28
	-100.00	150.72		-100.00	150.58		-100.00	150.42		-100.00	150.59
	-150.00	104.05		-150.00	103.55		-150.00	102.15		-150.00	100.30
	-200.00	71.46		-200.00	70.68		-200.00	69.50		-200.00	69.21
	-250.00	35.17		-250.00	34.91		-250.00	35.24		-250.00	37.40
	-300.00	14.10		-300.00	14.19		-300.00	14.67		-300.00	16.02
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
20.00	350.00	**********	25.00	350.00	**********	30.00	350.00	**********	35.00	350.00	**********
	300.00	12.16		300.00	16.62		300.00	16.39		300.00	12.75
	250.00	34.02		250.00	31.48		250.00	26.16		250.00	21.87
	200.00	56.32		200.00	52.51		200.00	48.56		200.00	46.25
	150.00	89.02		150.00	88.28		150.00	89.61		150.00	91.81
	100.00	147.17		100.00	147.35		100.00	147.78		100.00	148.83
	50.00	203.78		50.00	203.48		50.00	203.14		50.00	202.83
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	196.29		-50.00	196.26		-50.00	196.24		-50.00	196.30
	-100.00	150.99		-100.00	151.42		-100.00	151.96		-100.00	152.77
	-150.00	98.90		-150.00	98.92		-150.00	100.53		-150.00	102.82
	-200.00	68.63		-200.00	66.09		-200.00	62.64		-200.00	60.80
	-250.00	40.11		-250.00	40.62		-250.00	38.00		-250.00	33.86
	-300.00	18.47		-300.00	21.17		-300.00	22.14		-300.00	19.83
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
40.00	350.00	**********	45.00	350.00	**********	50.00	350.00	**********	55.00	350.00	**********
	300.00	9.02		300.00	7.14		300.00	6.97		300.00	8.22
	250.00	19.78		250.00	18.90		250.00	19.33		250.00	22.07
	200.00	46.19		200.00	47.97		200.00	50.97		200.00	54.46
	150.00	93.88		150.00	95.44		150.00	96.21		150.00	95.75
	100.00	150.10		100.00	150.75		100.00	150.60		100.00	150.30
	50.00	202.49		50.00	202.04		50.00	201.51		50.00	201.01
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	196.39		-50.00	196.40		-50.00	196.39		-50.00	196.44
	-100.00	153.62		-100.00	154.15		-100.00	154.36		-100.00	154.35
	-150.00	104.36		-150.00	104.32		-150.00	102.83		-150.00	100.53
	-200.00	60.80		-200.00	60.50		-200.00	59.17		-200.00	58.72

AUG

ORIGINAL PAGE IS
OF POOR QUALITY

	-250.00	30.36		-250.00	28.77		-250.00	29.49		-250.00	32.03
	-300.00	15.12		-300.00	11.37		-300.00	11.43		-300.00	14.59
	-350.00	*********		-350.00	*********		-350.00	*********		-350.00	*********
60.00	350.00	*********	65.00	350.00	*********	70.00	350.00	*********	75.00	350.00	*********
	300.00	10.69		300.00	12.48		300.00	10.59		300.00	4.77
	250.00	26.04		250.00	28.05		250.00	26.36		250.00	22.67
	200.00	57.25		200.00	58.10		200.00	56.67		200.00	53.86
	150.00	94.05		150.00	91.94		150.00	90.73		150.00	91.28
	100.00	150.34		100.00	150.54		100.00	150.62		100.00	150.66
	50.00	200.49		50.00	199.81		50.00	198.99		50.00	198.21
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	196.50		-50.00	196.44		-50.00	196.27		-50.00	196.15
	-100.00	153.94		-100.00	152.95		-100.00	151.70		-100.00	150.85
	-150.00	97.96		-150.00	95.62		-150.00	94.19		-150.00	94.24
	-200.00	60.55		-200.00	63.04		-200.00	63.33		-200.00	60.57
	-250.00	34.74		-250.00	35.70		-250.00	34.07		-250.00	30.54
	-300.00	16.95		-300.00	15.59		-300.00	11.77		-300.00	9.00
	-350.00	*********		-350.00	*********		-350.00	*********		-350.00	*********
80.00	350.00	*********	85.00	350.00	*********	90.00	350.00	*********	95.00	350.00	*********
	300.00	0.0		300.00	0.0		300.00	2.74		300.00	6.79
	250.00	19.84		250.00	19.19		250.00	20.41		250.00	22.95
	200.00	51.21		200.00	49.90		200.00	50.37		200.00	52.61
	150.00	93.38		150.00	95.86		150.00	97.32		150.00	97.06
	100.00	150.87		100.00	151.17		100.00	151.28		100.00	151.05
	50.00	197.61		50.00	197.18		50.00	196.82		50.00	196.48
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	196.23		-50.00	196.48		-50.00	196.82		-50.00	197.18
	-100.00	150.73		-100.00	151.05		-100.00	151.28		-100.00	151.17
	-150.00	95.58		-150.00	97.06		-150.00	97.32		-150.00	95.86
	-200.00	56.34		-200.00	52.61		-200.00	50.37		-200.00	49.90
	-250.00	26.48		-250.00	22.95		-250.00	20.41		-250.00	19.19
	-300.00	8.24		-300.00	6.79		-300.00	2.74		-300.00	0.0
	-350.00	*********		-350.00	*********		-350.00	*********		-350.00	*********
100.00	350.00	*********	105.00	350.00	*********	110.00	350.00	*********	115.00	350.00	*********
	300.00	8.24		300.00	9.00		300.00	11.77		300.00	15.59
	250.00	26.48		250.00	30.54		250.00	34.07		250.00	35.70
	200.00	56.34		200.00	60.57		200.00	63.33		200.00	63.04
	150.00	95.58		150.00	94.24		150.00	94.19		150.00	95.62
	100.00	150.73		100.00	150.85		100.00	151.70		100.00	152.55
	50.00	196.23		50.00	196.15		50.00	196.27		50.00	196.44
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	197.61		-50.00	198.21		-50.00	198.99		-50.00	199.81
	-100.00	150.87		-100.00	150.66		-100.00	150.62		-100.00	150.54
	-150.00	93.38		-150.00	91.28		-150.00	90.73		-150.00	91.94
	-200.00	51.21		-200.00	53.86		-200.00	56.67		-200.00	58.10
	-250.00	19.84		-250.00	22.67		-250.00	26.36		-250.00	28.05
	-300.00	0.0		-300.00	4.77		-300.00	10.59		-300.00	12.48
	-350.00	*********		-350.00	*********		-350.00	*********		-350.00	*********
120.00	350.00	*********	125.00	350.00	*********	130.00	350.00	*********	135.00	350.00	*********
	300.00	16.95		300.00	14.59		300.00	11.43		300.00	11.37
	250.00	34.74		250.00	32.03		250.00	29.49		250.00	28.77
	200.00	60.55		200.00	59.72		200.00	59.17		200.00	60.50
	150.00	97.96		150.00	100.53		150.00	102.83		150.00	104.32
	100.00	153.94		100.00	154.35		100.00	154.36		100.00	154.15
	50.00	196.50		50.00	196.44		50.00	196.39		50.00	196.40
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	200.49		-50.00	201.01		-50.00	201.51		-50.00	202.04
	-100.00	150.34		-100.00	150.30		-100.00	150.60		-100.00	150.75
	-150.00	94.05		-150.00	95.75		-150.00	96.21		-150.00	95.44
	-200.00	57.25		-200.00	54.46		-200.00	50.97		-200.00	47.97

	-250.00	26.04		-250.00	22.07		-250.00	19.33		-250.00	18.90
	-300.00	10.69		-300.00	8.22		-300.00	6.97		-300.00	7.14
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
140.00	350.00	**********	145.00	350.00	**********	150.00	350.00	**********	155.00	350.00	**********
	300.00	15.12		300.00	19.83		300.00	22.14		300.00	21.17
	250.00	30.36		250.00	33.86		250.00	38.00		250.00	40.62
	200.00	60.80		200.00	60.80		200.00	62.64		200.00	66.09
	150.00	104.36		150.00	102.82		150.00	100.53		150.00	98.92
	100.00	153.62		100.00	152.77		100.00	151.96		100.00	151.42
	50.00	196.09		50.00	196.30		50.00	196.24		50.00	196.26
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	202.49		-50.00	202.83		-50.00	203.14		-50.00	203.48
	-100.00	150.10		-100.00	148.83		-100.00	147.78		-100.00	147.35
	-150.00	93.88		-150.00	91.81		-150.00	89.61		-150.00	88.28
	-200.00	46.19		-200.00	46.25		-200.00	48.56		-200.00	52.51
	-250.00	19.78		-250.00	21.87		-250.00	26.16		-250.00	31.48
	-300.00	9.02		-300.00	12.75		-300.00	16.39		-300.00	16.62
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
160.00	350.00	**********	165.00	350.00	**********	170.00	350.00	**********	175.00	350.00	**********
	300.00	18.47		300.00	16.02		300.00	14.67		300.00	14.19
	250.00	40.11		250.00	37.40		250.00	35.24		250.00	34.91
	200.00	68.63		200.00	69.21		200.00	69.50		200.00	70.68
	150.00	98.90		150.00	100.30		150.00	102.15		150.00	103.55
	100.00	150.99		100.00	150.59		100.00	150.42		100.00	150.58
	50.00	196.29		50.00	196.28		50.00	196.31		50.00	196.41
	0.0	208.97		0.0	208.97		0.0	208.97		0.0	208.97
	-50.00	203.78		-50.00	203.98		-50.00	204.16		-50.00	204.35
	-100.00	147.17		-100.00	147.09		-100.00	147.48		-100.00	148.33
	-150.00	89.02		-150.00	92.17		-150.00	96.61		-150.00	100.37
	-200.00	56.32		-200.00	58.36		-200.00	58.41		-200.00	57.60
	-250.00	34.02		-250.00	31.47		-250.00	25.87		-250.00	21.13
	-300.00	12.16		-300.00	5.66		-300.00	0.99		-300.00	0.0
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
1,0,2,18,17,30,36,16.,5.32E-5,2.27E-4,
7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,
 0.0,-0.2,-0.4,-0.7,-1.0,-1.8,-3.5
-3.5,-1.8,-1.0,-0.7,-0.4,-0.2, 0.0
 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2
-4.0,-2.3,-1.3,-0.7,-0.3,-0.1, 0.0
 0.0,-0.2,-0.7,-1.2,-1.8,-2.6,-3.9
-2.8,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0
 0.0, 0.0,-0.1,-0.5,-1.2,-2.2,-4.2
-3.0,-1.5,-0.7,-0.3,-0.1, 0.0, 0.0
 0.0,-0.3,-0.8,-1.3,-2.0,-2.9,-5.2
-3.7,-2.8,-2.0,-1.2,-0.6,-0.2, 0.0
 0.0,-0.2,-0.6,-1.2,-2.0,-2.9,-5.0
-3.5,-1.9,-1.2,-0.7,-0.4,-0.2, 0.0
 0.0,-0.2,-0.4,-0.8,-1.2,-1.9,-3.5
-3.5,-2.4,-1.5,-0.9,-0.5,-0.2, 0.0
 0.0,-0.1,-0.4,-0.9,-1.6,-2.7,-4.1
-2.9,-1.8,-1.0,-0.6,-0.3,-0.1, 0.0
 0.0, 0.0,-0.2,-0.5,-1.1,-1.9,-2.9
-3.2,-2.0,-1.2,-0.6,-0.3,-0.1, 0.0
 0.0,-0.1,-0.3,-0.7,-1.4,-2.2,-3.2
-2.9,-1.8,-1.1,-0.6,-0.2,-0.1, 0.0
 0.0, 0.0,-0.2,-0.5,-1.1,-1.9,-2.9
-3.2,-2.0,-1.2,-0.6,-0.3,-0.1, 0.0
 0.0,-0.1,-0.4,-0.9,-1.6,-2.7,-4.1
-2.9,-1.8,-1.0,-0.6,-0.3,-0.1, 0.0
 0.0,-0.2,-0.4,-0.8,-1.2,-1.9,-3.5
-3.5,-2.4,-1.5,-0.9,-0.5,-0.2, 0.0
 0.0,-0.2,-0.6,-1.2,-2.0,-2.9,-5.0
-3.5,-1.9,-1.2,-0.7,-0.4,-0.2, 0.0
 0.0,-0.3,-0.8,-1.3,-2.0,-2.9,-5.2
-3.7,-2.8,-2.0,-1.2,-0.6,-0.2, 0.0
 0.0, 0.0,-0.1,-0.5,-1.2,-2.2,-4.2
-3.0,-1.5,-0.7,-0.3,-0.1, 0.0, 0.0
 0.0,-0.2,-0.7,-1.2,-1.8,-2.6,-3.9
-2.8,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0
 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2
-4.0,-2.3,-1.3,-0.7,-0.3,-0.1, 0.0
End of file
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ORIGINAL PAGE IS
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 8.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 17

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

```
 1   0.0 -0.2 -0.4 -0.7 -1.0 -1.8 -3.5*************** -3.5 -1.8 -1.0 -0.7 -0.4 -0.2  0.0
 2   0.0 -0.2 -0.4 -0.8 -1.1 -2.0 -3.2*************** -3.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0
 3   0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2*************** -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0
 4   0.0 -0.2 -0.7 -1.1 -1.5 -2.4 -3.5*************** -3.5 -2.5 -1.7 -1.0 -0.5 -0.2  0.0
 5   0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.9*************** -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0
 6   0.0 -0.1 -0.4 -0.9 -1.6 -2.5 -4.2*************** -2.5 -1.3 -0.7 -0.4 -0.3 -0.1  0.0
 7   0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2*************** -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0
 8   0.0 -0.1 -0.3 -0.7 -1.3 -2.2 -4.5*************** -3.6 -2.4 -1.5 -0.8 -0.3 -0.1  0.0
 9   0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2*************** -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0
10   0.0 -0.3 -0.9 -1.6 -2.4 -3.4 -5.6*************** -3.5 -2.3 -1.7 -1.1 -0.6 -0.2  0.0
11   0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0*************** -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0
12   0.0 -0.1 -0.4 -0.8 -1.3 -2.1 -3.9*************** -3.6 -2.1 -1.3 -0.7 -0.4 -0.2  0.0
13   0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5*************** -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0
14   0.0 -0.2 -0.5 -1.0 -1.5 -2.4 -3.9*************** -3.1 -2.2 -1.3 -0.8 -0.4 -0.2  0.0
15   0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1*************** -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0
16   0.0  0.0 -0.2 -0.6 -1.3 -2.3 -3.5*************** -3.1 -1.8 -1.0 -0.5 -0.3 -0.1  0.0
17   0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9*************** -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0
18   0.0 -0.1 -0.3 -0.6 -1.3 -2.0 -3.0*************** -3.0 -1.9 -1.2 -0.6 -0.3 -0.1  0.0
19   0.0 -0.1 -0.3 -0.7 -1.4 -2.2 -3.2*************** -2.9 -1.8 -1.1 -0.6 -0.2 -0.1  0.0
20   0.0 -0.1 -0.3 -0.6 -1.3 -2.0 -3.0*************** -3.0 -1.9 -1.2 -0.6 -0.3 -0.1  0.0
21   0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9*************** -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0
22   0.0  0.0 -0.2 -0.6 -1.3 -2.3 -3.5*************** -3.1 -1.8 -1.0 -0.5 -0.3 -0.1  0.0
23   0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1*************** -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0
24   0.0 -0.2 -0.5 -1.0 -1.5 -2.4 -3.9*************** -3.1 -2.2 -1.3 -0.8 -0.4 -0.2  0.0
25   0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5*************** -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0
26   0.0 -0.1 -0.4 -0.8 -1.3 -2.1 -3.9*************** -3.6 -2.1 -1.3 -0.7 -0.4 -0.2  0.0
27   0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0*************** -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0
28   0.0 -0.3 -0.9 -1.6 -2.4 -3.4 -5.6*************** -3.5 -2.3 -1.7 -1.1 -0.6 -0.2  0.0
29   0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2*************** -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0
30   0.0 -0.1 -0.3 -0.7 -1.3 -2.2 -4.5*************** -3.6 -2.4 -1.5 -0.8 -0.3 -0.1  0.0
31   0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2*************** -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0
32   0.0 -0.1 -0.4 -0.9 -1.6 -2.5 -4.2*************** -2.5 -1.3 -0.7 -0.4 -0.3 -0.1  0.0
33   0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.9*************** -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0
34   0.0 -0.2 -0.7 -1.1 -1.5 -2.4 -3.5*************** -3.5 -2.5 -1.7 -1.0 -0.5 -0.2  0.0
35   0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2*************** -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0
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36      0.0 -0.2 -0.4 -0.8 -1.1 -2.0 -3.2*************** -3.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

      1                     0.2234E-01                    0.4810E+00

      2                     0.1507E-01                    0.3339E+00

      3                     0.1573E-01                    0.3264E+00

      4                     0.1718E-01                    0.3336E+00

RESULT IS FROM ITERATION:    4
MISSING PART OF THE PROJECTION DATA IN PERCENTS:       17.6

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.2033E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X: -800-745-690-634-579-524-469-414-359-303-248-193-138 -83 -28  28  83 138 193 248 303 359 414 469 524 579 634 690 745 800

800  ************************************************************************************************************************
745  ****************************************  -1 -13 -16  -8   0   0  -6 -16 -14   0*****************************************
690  ********************************   0 -12 -20 -14  -9  -8 -10  -8  -5 -10 -15 -15   0   0*********************************
634  ************************   0   0 -19 -23 -15 -10 -13 -19 -22 -20 -16 -14 -11  -4  -6  -3   0   0*************************
579  ********************   0   0  -8  -9 -19 -23 -23 -23 -27 -30 -29 -26 -22 -17  -9   0   0  -4   0   0*********************
524  ****************   0  -6   0   0 -10 -24 -28 -32 -36 -34 -35 -36 -34 -31 -19 -11  -9  -5   0   0  -1   0*****************
469  ************   0   0   0  -5   0  -4 -13 -25 -34 -44 -57 -44 -48 -56 -32 -18 -10  -8  -8  -4  -5   0   0   0*************
414  ************   0  -2   0   0   0  -1  -8 -27 -52 -57 -63 -62 -63 -53 -35 -32 -13  -4  -6  -2   0   0   0   0*************
359  ********   0  -3   0  -1  -1   0  -6 -16 -31 -46 -69 -85 -93 -84 -60 -39 -24 -17 -12  -9   0   0  -1   0 -14   0*********
303  ********  -1  -7   0  -8  -4   0  -6 -11 -17 -35 -69-110-137-124 -84 -44 -18 -15 -23 -21  -9 -12 -20 -16 -22 -13*********
248  ****  -2 -18  -6  -9 -14 -16 -21 -20  -9 -16 -25 -61-124-184-181-119 -56 -21 -28 -34 -42 -37 -32 -32 -25 -17 -24  -3****
193  **** -18 -19 -13 -20 -26 -31 -53 -46 -37 -33 -44 -77-169********-185 -90 -52 -39 -45 -52 -60 -40 -32 -24 -13 -16 -15****
138  **** -18 -13 -18 -24 -29 -35 -50 -61 -68 -71 -88************************-115 -87 -73 -63 -54 -38 -28 -19 -12  -7 -14****
 83  ****  -5  -4 -14 -19 -21 -39 -42 -55 -76 -99-154************************-203-143-110 -80 -61 -51 -27 -23 -16  -5  -7****
 28  ****   0   0  -6 -12 -15 -25 -40 -55 -78-114********************************-167-130 -96 -71 -49 -36 -31 -22  -8   0****
-28  ****   0   0  -6 -12 -15 -25 -40 -55 -78-114********************************-167-130 -96 -71 -49 -36 -31 -22  -8   0****
-83  ****  -5  -4 -14 -19 -21 -39 -42 -55 -76 -99-154************************-203-143-110 -80 -61 -51 -27 -23 -16  -5  -7****
```

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-138 ****  -18 -13 -18 -24 -29 -35 -50 -61 -68 -71 -88************************-115 -87 -73 -63 -54 -38 -28 -19 -12  -7 -14****
-193 ****  -18 -19 -13 -20 -26 -31 -53 -46 -37 -33 -44 -77-169********-185 -90 -52 -39 -45 -52 -60 -40 -32 -24 -13 -16 -15****
-248 ****   -2 -18  -6  -9 -14 -16 -21 -20  -9 -16 -25 -61-124-184-181-119 -56 -21 -28 -34 -42 -37 -32 -32 -25 -17 -24  -3****
-303 ********   -1  -7   0  -8  -4   0  -6 -11 -17 -35 -69-110-137-124 -84 -44 -18 -15 -23 -21  -9 -12 -20 -16 -22 -13********
-359 ********    0  -3   0  -1  -1   0  -6 -16 -31 -46 -69 -85 -93 -84 -60 -39 -24 -17 -12  -9   0   0  -1   0 -14   0********
-414 ************    0  -2   0   0   0  -1  -8 -27 -52 -57 -63 -62 -63 -53 -35 -32 -13  -4  -6  -2   0   0   0   0************
-469 ************    0   0   0  -5   0  -4 -13 -25 -34 -44 -57 -44 -48 -56 -32 -18 -10  -8  -8  -4  -5   0   0   0************
-524 ****************    0  -6   0   0 -10 -24 -28 -32 -36 -34 -35 -36 -34 -31 -19 -11  -9  -5   0   0  -1   0****************
-579 ********************    0   0  -8  -9 -19 -23 -23 -23 -27 -30 -29 -26 -22 -17  -9   0   0  -4   0   0********************
-634 ************************    0   0 -19 -23 -15 -10 -13 -19 -22 -20 -16 -14 -11  -4  -6  -3   0   0************************
-690 ********************************    0 -12 -20 -14  -9  -8 -10  -8  -5 -10 -15 -15   0   0********************************
-745 ****************************************  -1 -13 -16  -8   0   0  -6 -16 -14   0****************************************
-800 ************************************************************************************************************************
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ORIGINAL PAGE IS
OF POOR QUALITY

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
-1,0,2,18,17,33,36,16.,5.32E-5,2.27E-4,
7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,7,
 0.0,-0.2,-0.4,-0.7,-1.0,-1.8,-3.5
-3.5,-1.8,-1.0,-0.7,-0.4,-0.2, 0.0
 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2
-4.0,-2.3,-1.3,-0.7,-0.3,-0.1, 0.0
 0.0,-0.2,-0.7,-1.2,-1.8,-2.6,-3.9
-2.8,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0
 0.0, 0.0,-0.1,-0.5,-1.2,-2.2,-4.2
-3.0,-1.5,-0.7,-0.3,-0.1, 0.0, 0.0
 0.0,-0.3,-0.8,-1.3,-2.0,-2.9,-5.2
-3.7,-2.8,-2.0,-1.2,-0.6,-0.2, 0.0
 0.0,-0.2,-0.6,-1.2,-2.0,-2.9,-5.0
-3.5,-1.9,-1.2,-0.7,-0.4,-0.2, 0.0
 0.0,-0.2,-0.4,-0.8,-1.2,-1.9,-3.5
-3.5,-2.4,-1.5,-0.9,-0.5,-0.2, 0.0
 0.0,-0.1,-0.4,-0.9,-1.6,-2.7,-4.1
-2.9,-1.8,-1.0,-0.6,-0.3,-0.1, 0.0
 0.0, 0.0,-0.2,-0.5,-1.1,-1.9,-2.9
-3.2,-2.0,-1.2,-0.6,-0.3,-0.1, 0.0
 0.0,-0.1,-0.3,-0.7,-1.4,-2.2,-3.2
-2.9,-1.8,-1.1,-0.6,-0.2,-0.1, 0.0
 0.0, 0.0,-0.2,-0.5,-1.1,-1.9,-2.9
-3.2,-2.0,-1.2,-0.6,-0.3,-0.1, 0.0
 0.0,-0.1,-0.4,-0.9,-1.6,-2.7,-4.1
-2.9,-1.8,-1.0,-0.6,-0.3,-0.1, 0.0
 0.0,-0.2,-0.4,-0.8,-1.2,-1.9,-3.5
-3.5,-2.4,-1.5,-0.9,-0.5,-0.2, 0.0
 0.0,-0.2,-0.6,-1.2,-2.0,-2.9,-5.0
-3.5,-1.9,-1.2,-0.7,-0.4,-0.2, 0.0
 0.0,-0.3,-0.8,-1.3,-2.0,-2.9,-5.2
-3.7,-2.8,-2.0,-1.2,-0.6,-0.2, 0.0
 0.0, 0.0,-0.1,-0.5,-1.2,-2.2,-4.2
-3.0,-1.5,-0.7,-0.3,-0.1, 0.0, 0.0
 0.0,-0.2,-0.7,-1.2,-1.8,-2.6,-3.9
-2.8,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0
 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2
-4.0,-2.3,-1.3,-0.7,-0.3,-0.1, 0.0

End of file
```

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 8.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 17

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	-0.2	-0.4	-0.7	-1.0	-1.8	-3.5***************	-3.5	-1.8	-1.0	-0.7	-0.4	-0.2	0.0
2	0.0	-0.2	-0.4	-0.8	-1.1	-2.0	-3.2***************	-3.9	-1.8	-1.0	-0.6	-0.3	-0.1	0.0
3	0.0	-0.2	-0.5	-0.9	-1.2	-2.2	-3.2***************	-4.0	-2.3	-1.3	-0.7	-0.3	-0.1	0.0
4	0.0	-0.2	-0.7	-1.1	-1.5	-2.4	-3.5***************	-3.5	-2.5	-1.7	-1.0	-0.5	-0.2	0.0
5	0.0	-0.2	-0.7	-1.2	-1.8	-2.6	-3.9***************	-2.8	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
6	0.0	-0.1	-0.4	-0.9	-1.6	-2.5	-4.2***************	-2.5	-1.3	-0.7	-0.4	-0.3	-0.1	0.0
7	0.0	0.0	-0.1	-0.5	-1.2	-2.2	-4.2***************	-3.0	-1.5	-0.7	-0.3	-0.1	0.0	0.0
8	0.0	-0.1	-0.3	-0.7	-1.3	-2.2	-4.5***************	-3.6	-2.4	-1.5	-0.8	-0.3	-0.1	0.0
9	0.0	-0.3	-0.8	-1.3	-2.0	-2.9	-5.2***************	-3.7	-2.8	-2.0	-1.2	-0.6	-0.2	0.0
10	0.0	-0.3	-0.9	-1.6	-2.4	-3.4	-5.6***************	-3.5	-2.3	-1.7	-1.1	-0.6	-0.2	0.0
11	0.0	-0.2	-0.6	-1.2	-2.0	-2.9	-5.0***************	-3.5	-1.9	-1.2	-0.7	-0.4	-0.2	0.0
12	0.0	-0.1	-0.4	-0.8	-1.3	-2.1	-3.9***************	-3.6	-2.1	-1.3	-0.7	-0.4	-0.2	0.0
13	0.0	-0.2	-0.4	-0.8	-1.2	-1.9	-3.5***************	-3.5	-2.4	-1.5	-0.9	-0.5	-0.2	0.0
14	0.0	-0.2	-0.5	-1.0	-1.5	-2.4	-3.9***************	-3.1	-2.2	-1.3	-0.8	-0.4	-0.2	0.0
15	0.0	-0.1	-0.4	-0.9	-1.6	-2.7	-4.1***************	-2.9	-1.8	-1.0	-0.6	-0.3	-0.1	0.0
16	0.0	0.0	-0.2	-0.6	-1.3	-2.3	-3.5***************	-3.1	-1.8	-1.0	-0.5	-0.3	-0.1	0.0
17	0.0	0.0	-0.2	-0.5	-1.1	-1.9	-2.9***************	-3.2	-2.0	-1.2	-0.6	-0.3	-0.1	0.0
18	0.0	-0.1	-0.3	-0.6	-1.3	-2.0	-3.0***************	-3.0	-1.9	-1.2	-0.6	-0.3	-0.1	0.0
19	0.0	-0.1	-0.3	-0.7	-1.4	-2.2	-3.2***************	-2.9	-1.8	-1.1	-0.6	-0.2	-0.1	0.0
20	0.0	-0.1	-0.3	-0.6	-1.3	-2.0	-3.0***************	-3.0	-1.9	-1.2	-0.6	-0.3	-0.1	0.0
21	0.0	0.0	-0.2	-0.5	-1.1	-1.9	-2.9***************	-3.2	-2.0	-1.2	-0.6	-0.3	-0.1	0.0
22	0.0	0.0	-0.2	-0.6	-1.3	-2.3	-3.5***************	-3.1	-1.8	-1.0	-0.5	-0.3	-0.1	0.0
23	0.0	-0.1	-0.4	-0.9	-1.6	-2.7	-4.1***************	-2.9	-1.8	-1.0	-0.6	-0.3	-0.1	0.0
24	0.0	-0.2	-0.5	-1.0	-1.5	-2.4	-3.9***************	-3.1	-2.2	-1.3	-0.8	-0.4	-0.2	0.0
25	0.0	-0.2	-0.4	-0.8	-1.2	-1.9	-3.5***************	-3.5	-2.4	-1.5	-0.9	-0.5	-0.2	0.0
26	0.0	-0.1	-0.4	-0.8	-1.3	-2.1	-3.9***************	-3.6	-2.1	-1.3	-0.7	-0.4	-0.2	0.0
27	0.0	-0.2	-0.6	-1.2	-2.0	-2.9	-5.0***************	-3.5	-1.9	-1.2	-0.7	-0.4	-0.2	0.0
28	0.0	-0.3	-0.9	-1.6	-2.4	-3.4	-5.6***************	-3.5	-2.3	-1.7	-1.1	-0.6	-0.2	0.0
29	0.0	-0.3	-0.8	-1.3	-2.0	-2.9	-5.2***************	-3.7	-2.8	-2.0	-1.2	-0.6	-0.2	0.0
30	0.0	-0.1	-0.3	-0.7	-1.3	-2.2	-4.5***************	-3.6	-2.4	-1.5	-0.8	-0.3	-0.1	0.0
31	0.0	0.0	-0.1	-0.5	-1.2	-2.2	-4.2***************	-3.0	-1.5	-0.7	-0.3	-0.1	0.0	0.0
32	0.0	-0.1	-0.4	-0.9	-1.6	-2.5	-4.2***************	-2.5	-1.3	-0.7	-0.4	-0.3	-0.1	0.0
33	0.0	-0.2	-0.7	-1.2	-1.8	-2.6	-3.9***************	-2.8	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
34	0.0	-0.2	-0.7	-1.1	-1.5	-2.4	-3.5***************	-3.5	-2.5	-1.7	-1.0	-0.5	-0.2	0.0
35	0.0	-0.2	-0.5	-0.9	-1.2	-2.2	-3.2***************	-4.0	-2.3	-1.3	-0.7	-0.3	-0.1	0.0

ORIGINAL PAGE IS
OF POOR QUALITY

36 0.0 -0.2 -0.4 -0.8 -1.1 -2.0 -3.2*************** -3.9 -1.8 -1.0 -0.6 -0.3 -0.1 0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1	0.2234E-01	0.4810E+00
2	0.1507E-01	0.3339E+00
3	0.1573E-01	0.3264E+00
4	0.1718E-01	0.3336E+00

RESULT IS FROM ITERATION: 4
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 17.6

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2814E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	800.00	**********	5.00	800.00	**********	10.00	800.00	**********	15.00	800.00	**********
	750.00	-22.00		750.00	-21.44		750.00	-20.08		750.00	-20.66
	700.00	-24.50		700.00	-23.54		700.00	-21.76		700.00	-22.77
	650.00	-30.63		650.00	-27.94		650.00	-23.32		650.00	-23.91
	600.00	-34.60		600.00	-30.12		600.00	-22.49		600.00	-22.56
	550.00	-40.37		550.00	-35.70		550.00	-27.79		550.00	-27.66
	500.00	-51.54		500.00	-47.87		500.00	-42.02		500.00	-42.60
	450.00	-67.04		450.00	-64.55		450.00	-60.45		450.00	-59.88
	400.00	-82.18		400.00	-80.18		400.00	-75.65		400.00	-70.91
	350.00	-107.06		350.00	-105.26		350.00	-99.76		350.00	-90.74
	300.00	-134.59		300.00	-133.01		300.00	-128.25		300.00	-119.84
	250.00	-170.37		250.00	-171.06		250.00	-170.98		250.00	-166.69
	200.00	-247.87		200.00	-246.99		200.00	-244.47		200.00	-240.16
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-199.21		-200.00	-198.44		-200.00	-195.76		-200.00	-190.44
	-250.00	-119.33		-250.00	-118.86		-250.00	-117.56		-250.00	-115.81
	-300.00	-80.18		-300.00	-80.23		-300.00	-80.71		-300.00	-81.44
	-350.00	-62.90		-350.00	-62.53		-350.00	-63.10		-350.00	-66.44
	-400.00	-47.73		-400.00	-47.80		-400.00	-49.96		-400.00	-56.34
	-450.00	-39.88		-450.00	-40.64		-450.00	-44.44		-450.00	-52.09
	-500.00	-27.47		-500.00	-29.15		-500.00	-33.96		-500.00	-40.42
	-550.00	-16.08		-550.00	-19.20		-550.00	-25.42		-550.00	-29.79
	-600.00	-11.61		-600.00	-16.49		-600.00	-24.84		-600.00	-27.52
	-650.00	-13.86		-650.00	-18.56		-650.00	-26.37		-650.00	-28.17
	-700.00	-14.07		-700.00	-18.48		-700.00	-25.57		-700.00	-26.66
	-750.00	-13.70		-750.00	-17.39		-750.00	-23.29		-750.00	-24.07
	-800.00	**********		-800.00	**********		-800.00	**********		-800.00	**********
20.00	800.00	**********	25.00	800.00	**********	30.00	800.00	**********	35.00	800.00	**********
	750.00	-25.29		750.00	-27.13		750.00	-18.17		750.00	-4.55
	700.00	-27.72		700.00	-28.72		700.00	-18.68		700.00	-5.43

ORIGINAL PAGE IS OF POOR QUALITY

	650.00	-30.50
	600.00	-31.10
	550.00	-36.01
	500.00	-49.39
	450.00	-62.18
	400.00	-66.07
	350.00	-79.53
	300.00	-107.38
	250.00	-157.03
	200.00	-232.78
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-182.15
	-250.00	-112.89
	-300.00	-80.89
	-350.00	-69.87
	-400.00	-62.59
	-450.00	-58.43
	-500.00	-44.29
	-550.00	-29.76
	-600.00	-23.45
	-650.00	-23.20
	-700.00	-21.50
	-750.00	-19.63
	-800.00	**********
40.00	800.00	**********
	750.00	0.0
	700.00	-0.76
	650.00	-0.66
	600.00	0.0
	550.00	-1.10
	500.00	-13.93
	450.00	-28.54
	400.00	-35.24
	350.00	-37.55
	300.00	-41.78
	250.00	-85.20
	200.00	-168.43
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-135.54
	-250.00	-68.24
	-300.00	-36.20
	-350.00	-21.04
	-400.00	-9.26
	-450.00	-8.98
	-500.00	-4.77
	-550.00	-1.00
	-600.00	-2.94
	-650.00	-6.62

	650.00	-32.05
	600.00	-33.75
	550.00	-39.14
	500.00	-51.63
	450.00	-61.18
	400.00	-60.07
	350.00	-67.90
	300.00	-91.39
	250.00	-142.32
	200.00	-220.28
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-171.08
	-250.00	-106.14
	-300.00	-76.34
	-350.00	-66.86
	-400.00	-59.75
	-450.00	-54.62
	-500.00	-39.51
	-550.00	-23.67
	-600.00	-15.99
	-650.00	-15.59
	-700.00	-14.29
	-750.00	-13.03
	-800.00	**********
45.00	800.00	**********
	750.00	-0.79
	700.00	-4.00
	650.00	-5.60
	600.00	-4.47
	550.00	-4.40
	500.00	-10.36
	450.00	-19.53
	400.00	-24.58
	350.00	-28.26
	300.00	-31.70
	250.00	-73.54
	200.00	-160.22
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-129.57
	-250.00	-60.89
	-300.00	-27.89
	-350.00	-16.17
	-400.00	-8.71
	-450.00	-10.74
	-500.00	-6.83
	-550.00	-1.80
	-600.00	-1.63
	-650.00	-4.62

	650.00	-20.30
	600.00	-20.42
	550.00	-26.97
	500.00	-41.62
	450.00	-53.05
	400.00	-52.93
	350.00	-57.12
	300.00	-73.46
	250.00	-123.45
	200.00	-202.57
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-158.16
	-250.00	-94.29
	-300.00	-65.71
	-350.00	-53.79
	-400.00	-44.15
	-450.00	-38.42
	-500.00	-25.52
	-550.00	-12.87
	-600.00	-8.43
	-650.00	-9.24
	-700.00	-8.72
	-750.00	-7.33
	-800.00	**********
50.00	800.00	**********
	750.00	-5.90
	700.00	-7.82
	650.00	-9.37
	600.00	-10.16
	550.00	-9.23
	500.00	-11.11
	450.00	-15.57
	400.00	-17.51
	350.00	-22.31
	300.00	-27.92
	250.00	-71.24
	200.00	-159.51
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-130.29
	-250.00	-60.12
	-300.00	-28.75
	-350.00	-21.16
	-400.00	-18.30
	-450.00	-19.60
	-500.00	-12.85
	-550.00	-4.70
	-600.00	-2.57
	-650.00	-4.98

	650.00	-5.13
	600.00	-2.76
	550.00	-9.03
	500.00	-25.36
	450.00	-40.58
	400.00	-44.93
	350.00	-47.26
	300.00	-56.18
	250.00	-103.10
	200.00	-183.50
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-145.61
	-250.00	-80.21
	-300.00	-50.64
	-350.00	-35.47
	-400.00	-23.13
	-450.00	-19.24
	-500.00	-11.01
	-550.00	-3.87
	-600.00	-4.14
	-650.00	-6.92
	-700.00	-7.37
	-750.00	-5.91
	-800.00	**********
55.00	800.00	**********
	750.00	-8.27
	700.00	-8.56
	650.00	-9.82
	600.00	-9.78
	550.00	-10.36
	500.00	-13.47
	450.00	-17.80
	400.00	-18.15
	350.00	-22.69
	300.00	-31.73
	250.00	-78.65
	200.00	-166.57
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-140.14
	-250.00	-67.59
	-300.00	-38.15
	-350.00	-33.02
	-400.00	-31.53
	-450.00	-30.35
	-500.00	-20.88
	-550.00	-12.12
	-600.00	-11.03
	-650.00	-13.74

ORIGINAL PAGE IS
OF POOR QUALITY

	-700.00	-7.83
	-750.00	-7.08
	-800.00	**********
60.00	800.00	**********
	750.00	-8.49
	700.00	-8.74
	650.00	-9.65
	600.00	-9.12
	550.00	-11.25
	500.00	-17.81
	450.00	-24.55
	400.00	-24.96
	350.00	-29.43
	300.00	-42.84
	250.00	-93.07
	200.00	-181.48
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-158.93
	-250.00	-83.25
	-300.00	-54.01
	-350.00	-48.93
	-400.00	-45.39
	-450.00	-41.78
	-500.00	-31.05
	-550.00	-23.41
	-600.00	-23.66
	-650.00	-25.95
	-700.00	-24.59
	-750.00	-22.84
	-800.00	**********
80.00	800.00	**********
	750.00	-22.14
	700.00	-25.04
	650.00	-26.64
	600.00	-26.73
	550.00	-34.27
	500.00	-50.27
	450.00	-60.87
	400.00	-63.38
	350.00	-81.28
	300.00	-114.37
	250.00	-175.08
	200.00	-265.91
	150.00	**********
	100.00	**********
	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-259.75
	-250.00	-178.46
	-300.00	-132.52
	-350.00	-103.62

	-700.00	-6.01
	-750.00	-6.30
	-800.00	**********
65.00	800.00	**********
	750.00	-10.71
	700.00	-12.17
	650.00	-13.92
	600.00	-13.47
	550.00	-16.05
	500.00	-24.76
	450.00	-32.66
	400.00	-33.36
	350.00	-40.10
	300.00	-59.20
	250.00	-111.71
	200.00	-202.41
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-183.46
	-250.00	-105.38
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	-350.00	-66.68
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	-450.00	-53.55
	-500.00	-41.65
	-550.00	-32.83
	-600.00	-30.84
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	-700.00	-27.90
	-750.00	-25.54
	-800.00	**********
85.00	800.00	**********
	750.00	-23.37
	700.00	-26.91
	650.00	-28.85
	600.00	-29.19
	550.00	-36.79
	500.00	-53.04
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	350.00	-92.79
	300.00	-129.16
	250.00	-188.75
	200.00	-277.68
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-275.45
	-250.00	-191.28
	-300.00	-139.94
	-350.00	-104.41

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	-800.00	**********
70.00	800.00	**********
	750.00	-16.04
	700.00	-18.36
	650.00	-20.65
	600.00	-20.35
	550.00	-23.56
	500.00	-33.72
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	400.00	-42.03
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	300.00	-77.89
	250.00	-133.16
	200.00	-225.80
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-210.24
	-250.00	-131.37
	-300.00	-96.57
	-350.00	-83.67
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	-450.00	-62.74
	-500.00	[illegible]
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	-800.00	**********
90.00	800.00	**********
	750.00	-26.05
	700.00	-29.96
	650.00	-32.07
	600.00	-31.83
	550.00	-37.81
	500.00	-51.84
	450.00	-63.55
	400.00	-72.46
	350.00	-100.55
	300.00	-138.52
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	200.00	-281.40
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	-281.40
	-250.00	-194.54
	-300.00	-138.52
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	-800.00	**********
75.00	800.00	**********
	750.00	-20.71
	700.00	-23.23
	650.00	-25.11
	600.00	-24.82
	550.00	-30.12
	500.00	-43.10
	450.00	-51.63
	400.00	-52.47
	350.00	-67.29
	300.00	-96.75
	250.00	-155.45
	200.00	-247.95
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-236.72
	-250.00	-157.32
	-300.00	-117.18
	-350.00	-96.75
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	-600.00	-26.46
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	-700.00	-22.00
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	-800.00	**********
95.00	800.00	**********
	750.00	-26.41
	700.00	-30.10
	650.00	-31.83
	600.00	-31.09
	550.00	-36.88
	500.00	-50.02
	450.00	-61.97
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	350.00	-104.41
	300.00	-139.94
	250.00	-191.28
	200.00	-275.45
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
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	-400.00	-76.23
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	-500.00	-50.30
	-550.00	-35.55
	-600.00	-27.52
	-650.00	-27.28
	-700.00	-25.64
	-750.00	-22.68
	-800.00	**********
100.00	800.00	**********
	750.00	-22.68
	700.00	-25.64
	650.00	-27.28
	600.00	-27.52
	550.00	-35.55
	500.00	-50.30
	450.00	-63.75
	400.00	-76.23
	350.00	-103.62
	300.00	-132.52
	250.00	-178.46
	200.00	-259.75
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-650.00	-26.64
	-700.00	-25.04
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	-800.00	**********
120.00	800.00	**********
	750.00	-22.84
	700.00	-24.59
	650.00	-25.95
	600.00	-23.66
	550.00	-23.41
	500.00	-31.05
	450.00	-41.78
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	300.00	-54.01
	250.00	-83.25
	200.00	-158.93
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********

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	-450.00	-61.97
	-500.00	-50.02
	-550.00	-36.88
	-600.00	-31.09
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	-700.00	-30.10
	-750.00	-26.41
	-800.00	**********
105.00	800.00	**********
	750.00	-19.65
	700.00	-22.00
	650.00	-24.46
	600.00	-26.46
	550.00	-35.85
	500.00	-51.32
	450.00	-65.82
	400.00	-77.15
	350.00	-96.75
	300.00	-117.18
	250.00	-157.32
	200.00	-236.72
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-247.95
	-250.00	-155.45
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	-550.00	-30.12
	-600.00	-24.82
	-650.00	-25.11
	-700.00	-23.23
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	-800.00	**********
125.00	800.00	**********
	750.00	-13.59
	700.00	-14.00
	650.00	-13.74
	600.00	-11.03
	550.00	-12.12
	500.00	-20.88
	450.00	-30.35
	400.00	-31.53
	350.00	-33.02
	300.00	-38.15
	250.00	-67.59
	200.00	-140.14
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********

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	-500.00	-51.84
	-550.00	-37.81
	-600.00	-31.83
	-650.00	-32.07
	-700.00	-29.96
	-750.00	-26.05
	-800.00	**********
110.00	800.00	**********
	750.00	-21.85
	700.00	-24.12
	650.00	-27.50
	600.00	-29.61
	550.00	-36.39
	500.00	-49.09
	450.00	-62.74
	400.00	-71.45
	350.00	-83.67
	300.00	-96.57
	250.00	-131.37
	200.00	-210.24
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
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	-600.00	-20.35
	-650.00	-20.65
	-700.00	-18.36
	-750.00	-16.04
	-800.00	**********
130.00	800.00	**********
	750.00	-6.67
	700.00	-6.10
	650.00	-4.98
	600.00	-2.57
	550.00	-4.70
	500.00	-12.85
	450.00	-19.60
	400.00	-18.30
	350.00	-21.16
	300.00	-28.75
	250.00	-60.12
	200.00	-130.29
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********

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	-550.00	-36.79
	-600.00	-29.19
	-650.00	-28.85
	-700.00	-26.91
	-750.00	-23.37
	-800.00	**********
115.00	800.00	**********
	750.00	-25.54
	700.00	-27.90
	650.00	-30.90
	600.00	-30.84
	550.00	-32.83
	500.00	-41.65
	450.00	-53.55
	400.00	-59.52
	350.00	-66.68
	300.00	-74.34
	250.00	-105.38
	200.00	-183.46
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-500.00	-24.76
	-550.00	-16.05
	-600.00	-13.47
	-650.00	-13.92
	-700.00	-12.17
	-750.00	-10.71
	-800.00	**********
135.00	800.00	**********
	750.00	-6.30
	700.00	-6.01
	650.00	-4.62
	600.00	-1.63
	550.00	-1.80
	500.00	-6.83
	450.00	-10.74
	400.00	-8.71
	350.00	-16.17
	300.00	-27.89
	250.00	-60.89
	200.00	-129.57
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********

	-100.00	**********
	-150.00	**********
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	-450.00	-24.55
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	-550.00	-11.25
	-600.00	-9.12
	-650.00	-9.65
	-700.00	-8.74
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	-800.00	**********
140.00	800.00	**********
	750.00	-7.08
	700.00	-7.83
	650.00	-6.62
	600.00	-2.94
	550.00	-1.00
	500.00	-4.77
	450.00	-8.98
	400.00	-9.26
	350.00	-21.04
	300.00	-36.20
	250.00	-68.24
	200.00	-135.54
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-300.00	-41.78
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	-400.00	-35.24
	-450.00	-28.54
	-500.00	-13.93
	-550.00	-1.10
	-600.00	0.0
	-650.00	-0.66
	-700.00	-0.76
	-750.00	0.0
	-800.00	**********
160.00	800.00	**********
	750.00	-19.63
	700.00	-21.50
	650.00	-23.20
	600.00	-23.45
	550.00	-29.76
	500.00	-44.29
	450.00	-58.43
	400.00	-62.59
	350.00	-69.87
	300.00	-80.89
	250.00	-112.89

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	-150.00	**********
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	-250.00	-78.65
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	-350.00	-22.69
	-400.00	-18.15
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	-500.00	-13.47
	-550.00	-10.36
	-600.00	-9.78
	-650.00	-9.82
	-700.00	-8.56
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	-800.00	**********
145.00	800.00	**********
	750.00	-5.91
	700.00	-7.37
	650.00	-6.92
	600.00	-4.14
	550.00	-3.87
	500.00	-11.01
	450.00	-19.24
	400.00	-23.13
	350.00	-35.47
	300.00	-50.64
	250.00	-80.21
	200.00	-145.61
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-250.00	-103.10
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	-350.00	-47.26
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	-450.00	-40.58
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	-600.00	-2.76
	-650.00	-5.13
	-700.00	-5.43
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	-800.00	**********
165.00	800.00	**********
	750.00	-24.07
	700.00	-26.66
	650.00	-28.17
	600.00	-27.52
	550.00	-29.79
	500.00	-40.42
	450.00	-52.09
	400.00	-56.34
	350.00	-66.44
	300.00	-81.44
	250.00	-115.81

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	-350.00	-22.31
	-400.00	-17.51
	-450.00	-15.57
	-500.00	-11.11
	-550.00	-9.23
	-600.00	-10.16
	-650.00	-9.97
	-700.00	-7.82
	-750.00	-5.90
	-800.00	**********
150.00	800.00	**********
	750.00	-7.33
	700.00	-8.72
	650.00	-9.24
	600.00	-8.43
	550.00	-12.87
	500.00	-25.52
	450.00	-38.42
	400.00	-44.15
	350.00	-53.79
	300.00	-65.71
	250.00	-94.29
	200.00	-158.16
	150.00	**********
	100.00	**********
	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-400.00	-52.93
	-450.00	-53.05
	-500.00	-41.62
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	-600.00	-20.42
	-650.00	-20.30
	-700.00	-18.68
	-750.00	-18.17
	-800.00	**********
170.00	800.00	**********
	750.00	-23.29
	700.00	-25.57
	650.00	-26.37
	600.00	-24.84
	550.00	-25.42
	500.00	-33.96
	450.00	-44.44
	400.00	-49.96
	350.00	-63.10
	300.00	-80.71
	250.00	-117.56

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	-350.00	-28.26
	-400.00	-24.58
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	-550.00	-4.40
	-600.00	-4.47
	-650.00	-5.60
	-700.00	-4.00
	-750.00	-0.79
	-800.00	**********
155.00	800.00	**********
	750.00	-13.03
	700.00	-14.29
	650.00	-15.59
	600.00	-15.99
	550.00	-23.67
	500.00	-39.51
	450.00	-54.62
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	350.00	-66.86
	300.00	-76.34
	250.00	-106.14
	200.00	-171.08
	150.00	**********
	100.00	**********
	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********
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	-350.00	-67.90
	-400.00	-60.07
	-450.00	-61.18
	-500.00	-51.63
	-550.00	-39.14
	-600.00	-33.75
	-650.00	-32.05
	-700.00	-28.72
	-750.00	-27.13
	-800.00	**********
175.00	800.00	**********
	750.00	-17.39
	700.00	-18.48
	650.00	-18.56
	600.00	-16.49
	550.00	-19.20
	500.00	-29.15
	450.00	-40.64
	400.00	-47.80
	350.00	-62.53
	300.00	-80.23
	250.00	-118.86

200.00	-182.15
150.00	**********
100.00	**********
50.00	**********
0.0	**********
-50.00	**********
-100.00	**********
-150.00	**********
-200.00	-232.78
-250.00	-157.03
-300.00	-107.38
-350.00	-79.53
-400.00	-66.07
-450.00	-62.18
-500.00	-49.39
-550.00	-36.01
-600.00	-31.10
-650.00	-30.50
-700.00	-27.72
-750.00	-25.29
-800.00	**********

200.00	-190.44
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100.00	**********
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-100.00	**********
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-500.00	-42.60
-550.00	-27.66
-600.00	-22.56
-650.00	-23.91
-700.00	-22.77
-750.00	-20.66
-800.00	**********

200.00	-195.76
150.00	**********
100.00	**********
50.00	**********
0.0	**********
-50.00	**********
-100.00	**********
-150.00	**********
-200.00	-244.47
-250.00	-170.98
-300.00	-128.25
-350.00	-99.76
-400.00	-75.65
-450.00	-60.45
-500.00	-42.02
-550.00	-27.79
-600.00	-22.49
-650.00	-23.32
-700.00	-21.76
-750.00	-20.08
-800.00	**********

200.00	-198.44
150.00	**********
100.00	**********
50.00	**********
0.0	**********
-50.00	**********
-100.00	**********
-150.00	**********
-200.00	-246.99
-250.00	-171.06
-300.00	-133.01
-350.00	-105.26
-400.00	-80.18
-450.00	-64.55
-500.00	-47.87
-550.00	-35.70
-600.00	-30.12
-650.00	-27.94
-700.00	-23.54
-750.00	-21.44
-800.00	**********

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
1,0,2,18,21,30,36,20.,5.32E-5,2.27E-4,
9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.3,-1.9,-3.0,-5.0,
-5.0,-3.0,-1.9,-1.3,-0.8,-0.5,-0.2,-0.1, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,-8.0,
-5.5,-2.6,-1.6,-0.9,-0.5,-.25,-0.1,-.05, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.3,-1.9,-2.7,-4.1,-8.0,
-6.0,-3.8,-2.7,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.3,-0.5,-0.9,-1.6,-2.8,-7.0,
-3.6,-2.0,-1.1,-0.6,-0.3,-0.2,-0.1,-.05, 0.0,
 0.0,-0.2,-0.5,-0.9,-1.4,-2.0,-2.9,-4.1,-9.0,
-6.0,-3.6,-2.4,-1.7,-1.1,-0.7,-0.4,-0.2, 0.0,
 0.0,-0.2,-.45,-0.8,-1.3,-1.8,-2.5,-3.7,-7.0,
-4.0,-2.1,-1.3,-0.9,-0.6,-0.3,-0.2,-0.1, 0.0,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.2,-1.8,-3.0,-5.5,
-4.0,-2.8,-2.0,-1.5,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-0.6,-1.0,-1.6,-2.2,-3.0,-4.2,-7.0,
-4.2,-3.4,-2.8,-2.2,-1.7,-1.1,-0.6,-0.2, 0.0,
 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.5,-2.8,-4.8,
-3.7,-2.7,-2.0,-1.4,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-2.1,-3.4,-5.0,
-3.5,-2.5,-1.7,-1.2,-0.8,-0.5,-0.3,-0.2, 0.0,
 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.5,-2.8,-4.8,
-3.7,-2.7,-2.0,-1.4,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-0.6,-1.0,-1.6,-2.2,-3.0,-4.2,-7.0,
-4.2,-3.4,-2.8,-2.2,-1.7,-1.1,-0.6,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.2,-1.8,-3.0,-5.5,
-4.0,-2.8,-2.0,-1.5,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-.45,-0.8,-1.3,-1.8,-2.5,-3.7,-7.0,
-4.0,-2.1,-1.3,-0.9,-0.6,-0.3,-0.2,-0.1, 0.0,
 0.0,-0.2,-0.5,-0.9,-1.4,-2.0,-2.9,-4.1,-9.0,
-6.0,-3.6,-2.4,-1.7,-1.1,-0.7,-0.4,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.3,-0.5,-0.9,-1.6,-2.8,-7.0,
-3.6,-2.0,-1.1,-0.6,-0.3,-0.2,-0.1,-.05, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.3,-1.9,-2.7,-4.1,-8.0,
-6.0,-3.8,-2.7,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,-8.0,
-5.5,-2.6,-1.6,-0.9,-0.5,-.25,-0.1,-.05, 0.0,
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ORIGINAL PAGE IS
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 10.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 21

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	-0.1	-0.2	-0.5	-0.8	-1.3	-1.9	-3.0	-5.0***************	-5.0	-3.0	-1.9	-1.3	-0.8	-0.5	-0.2	-0.1	0.0
2	0.0	-0.1	-0.2	-0.5	-0.8	-1.4	-2.0	-3.1	-6.7***************	-4.4	-2.5	-1.4	-0.8	-0.5	-0.3	-0.1	-0.1	0.0
3	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-1.9	-3.0	-8.0***************	-5.5	-2.6	-1.6	-0.9	-0.5	-0.3	-0.1	-0.1	0.0
4	0.0	-0.0	-0.2	-0.5	-0.9	-1.5	-2.2	-3.5	-8.4***************	-6.6	-3.5	-2.4	-1.7	-1.1	-0.6	-0.4	-0.1	0.0
5	0.0	-0.1	-0.4	-0.8	-1.3	-1.9	-2.7	-4.1	-8.0***************	-6.0	-3.8	-2.7	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
6	0.0	-0.1	-0.4	-0.7	-1.1	-1.6	-2.4	-3.7	-7.3***************	-4.2	-2.8	-1.8	-1.3	-0.9	-0.6	-0.3	-0.1	0.0
7	0.0	-0.1	-0.2	-0.3	-0.5	-0.9	-1.6	-2.8	-7.0***************	-3.6	-2.0	-1.1	-0.6	-0.3	-0.2	-0.1	-0.1	0.0
8	0.0	-0.1	-0.2	-0.3	-0.6	-1.0	-1.8	-2.9	-7.8***************	-4.9	-2.7	-1.6	-1.0	-0.5	-0.3	-0.2	-0.1	0.0
9	0.0	-0.2	-0.5	-0.9	-1.4	-2.0	-2.9	-4.1	-9.0***************	-6.0	-3.6	-2.4	-1.7	-1.1	-0.7	-0.4	-0.2	0.0
10	0.0	-0.3	-0.7	-1.2	-1.9	-2.5	-3.4	-4.7	-8.8***************	-5.4	-3.2	-2.2	-1.6	-1.1	-0.7	-0.4	-0.2	0.0
11	0.0	-0.2	-0.4	-0.8	-1.3	-1.8	-2.5	-3.7	-7.0***************	-4.0	-2.1	-1.3	-0.9	-0.6	-0.3	-0.2	-0.1	0.0
12	0.0	-0.1	-0.1	-0.3	-0.6	-0.9	-1.5	-2.7	-5.3***************	-3.5	-1.9	-1.2	-0.8	-0.5	-0.2	-0.1	-0.0	0.0
13	0.0	-0.1	-0.2	-0.5	-0.8	-1.2	-1.8	-3.0	-5.5***************	-4.0	-2.8	-2.0	-1.5	-1.0	-0.6	-0.3	-0.1	0.0
14	0.0	-0.2	-0.5	-1.0	-1.5	-2.1	-2.8	-4.0	-6.7***************	-4.4	-3.5	-2.8	-2.2	-1.6	-1.0	-0.6	-0.2	0.0
15	0.0	-0.2	-0.6	-1.0	-1.6	-2.2	-3.0	-4.2	-7.0***************	-4.2	-3.4	-2.8	-2.2	-1.7	-1.1	-0.6	-0.2	0.0
16	0.0	-0.1	-0.3	-0.5	-0.8	-1.3	-2.1	-3.4	-5.9***************	-3.9	-3.0	-2.4	-1.8	-1.4	-0.8	-0.4	-0.1	0.0
17	0.0	0.0	0.0	-0.1	-0.3	-0.7	-1.5	-2.8	-4.8***************	-3.7	-2.7	-2.0	-1.4	-1.0	-0.6	-0.3	-0.1	0.0
18	0.0	0.0	-0.0	-0.2	-0.5	-0.9	-1.8	-3.1	-4.8***************	-3.6	-2.6	-1.8	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
19	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-2.1	-3.4	-5.0***************	-3.5	-2.5	-1.7	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
20	0.0	0.0	-0.0	-0.2	-0.5	-0.9	-1.8	-3.1	-4.8***************	-3.6	-2.6	-1.8	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
21	0.0	0.0	0.0	-0.1	-0.3	-0.7	-1.5	-2.8	-4.8***************	-3.7	-2.7	-2.0	-1.4	-1.0	-0.6	-0.3	-0.1	0.0
22	0.0	-0.1	-0.3	-0.5	-0.8	-1.3	-2.1	-3.4	-5.9***************	-3.9	-3.0	-2.4	-1.8	-1.4	-0.8	-0.4	-0.1	0.0
23	0.0	-0.2	-0.6	-1.0	-1.6	-2.2	-3.0	-4.2	-7.0***************	-4.2	-3.4	-2.8	-2.2	-1.7	-1.1	-0.6	-0.2	0.0
24	0.0	-0.2	-0.5	-1.0	-1.5	-2.1	-2.8	-4.0	-6.7***************	-4.4	-3.5	-2.8	-2.2	-1.6	-1.0	-0.6	-0.2	0.0
25	0.0	-0.1	-0.2	-0.5	-0.8	-1.2	-1.8	-3.0	-5.5***************	-4.0	-2.8	-2.0	-1.5	-1.0	-0.6	-0.3	-0.1	0.0
26	0.0	-0.1	-0.1	-0.3	-0.6	-0.9	-1.5	-2.7	-5.3***************	-3.5	-1.9	-1.2	-0.8	-0.5	-0.2	-0.1	-0.0	0.0
27	0.0	-0.2	-0.4	-0.8	-1.3	-1.8	-2.5	-3.7	-7.0***************	-4.0	-2.1	-1.3	-0.9	-0.6	-0.3	-0.2	-0.1	0.0
28	0.0	-0.3	-0.7	-1.2	-1.9	-2.5	-3.4	-4.7	-8.8***************	-5.4	-3.2	-2.2	-1.6	-1.1	-0.7	-0.4	-0.2	0.0
29	0.0	-0.2	-0.5	-0.9	-1.4	-2.0	-2.9	-4.1	-9.0***************	-6.0	-3.6	-2.4	-1.7	-1.1	-0.7	-0.4	-0.2	0.0
30	0.0	-0.1	-0.2	-0.3	-0.6	-1.0	-1.8	-2.9	-7.8***************	-4.9	-2.7	-1.6	-1.0	-0.5	-0.3	-0.2	-0.1	0.0
31	0.0	-0.1	-0.2	-0.3	-0.5	-0.9	-1.6	-2.8	-7.0***************	-3.6	-2.0	-1.1	-0.6	-0.3	-0.2	-0.1	-0.1	0.0
32	0.0	-0.1	-0.4	-0.7	-1.1	-1.6	-2.4	-3.7	-7.3***************	-4.2	-2.8	-1.8	-1.3	-0.9	-0.6	-0.3	-0.1	0.0
33	0.0	-0.1	-0.4	-0.8	-1.3	-1.9	-2.7	-4.1	-8.0***************	-6.0	-3.8	-2.7	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
34	0.0	-0.0	-0.2	-0.5	-0.9	-1.5	-2.2	-3.5	-8.4***************	-6.6	-3.5	-2.4	-1.7	-1.1	-0.6	-0.4	-0.1	0.0
35	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-1.9	-3.0	-8.0***************	-5.5	-2.6	-1.6	-0.9	-0.5	-0.3	-0.1	-0.1	0.0

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36       0.0 -0.1 -0.2 -0.5 -0.8 -1.4 -2.0 -3.1 -6.7*************** -4.4 -2.5 -1.4 -0.8 -0.5 -0.3 -0.1 -0.1  0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

     1                  0.4506E-01              0.1286E+01
     2                  0.2250E-01              0.7823E+00
     3                  0.2330E-01              0.7376E+00
     4                  0.2797E-01              0.7891E+00

RESULT IS FROM ITERATION:   3
MISSING PART OF THE PROJECTION DATA IN PERCENTS:      14.3

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.3904E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X: -100 -93 -86 -79 -72 -66 -59 -52 -45 -38 -31 -24 -17 -10  -3   3  10  17  24  31  38  45  52  59  66  72  79  86  93 100

 100 *******************************************************************************************************************
  93 ***************************************   0 -10 -22  -7   0   0   0 -14  -6   0****************************************
  86 ********************************   0   0 -12  -6  -1  -5   0   0   0   0  -4  -8   0   0*******************************
  79 ************************  -7 -11 -20  -7   0   0   0   0   0   0   0   0   0   0   0 -12  -6  -6**********************
  72 ********************   0  -8 -37 -10   0   0   0   0  -8   0   0   0   0   0   0  -4 -34   0   0********************
  66 ****************   0 -17   0  -6 -49 -50 -17 -11 -23 -28 -23 -15 -15 -19  -7  -9 -43 -46  -1   0  -4   0****************
  59 ************   0   0   0 -24  -3  -7 -28 -15   0  -4 -40 -38 -32 -31  -1   0  -5 -22  -4   0  -9   0   0   0************
  52 ************   0  -9   0   0 -19 -21 -48 -51  -9   0 -24 -42 -43 -21   0   0 -39 -42 -13  -4   0   0  -7  -2************
  45 ******** -15 -35  -7 -22   0   0  -5 -27 -72 -41 -11 -19 -75 -84 -19   0 -21 -57 -23   0   0   0 -21  -9 -39 -15********
  38 ********  -3 -38 -20 -63 -17 -15   0   0 -51 -69 -43 -35 -91 -92 -20 -21 -48 -42   0   0  -6 -13 -61 -16 -33   0********
  31 ****   0 -16  -6 -12 -56 -51 -64 -44 -15 -33 -77 -75 -54-144-125 -13 -36 -54 -27  -5 -24 -47 -38 -44   0   0  -9   0****
  24 ****   0   0   0   0 -26 -29 -57 -68 -61 -37 -63-108-135-263-264-132 -80 -36 -25 -41 -45 -41 -18 -17   0   0   0  -4****
  17 ****   0   0   0   0  -3   0  -2 -35 -73 -63 -62-146-308********-390-215 -96 -82 -83 -48 -15  -9 -14   0   0   0  -8****
  10 ****   0   0   0   0  -6 -15  -4 -10 -30 -40 -74-225****************-385-198-109 -73 -48 -37 -43 -29 -10  -1  -5  -6****
   3 **** -14 -20 -22 -31 -54 -66 -66 -95-100-106-146************************-321-229-182-146 -98 -88 -71 -47 -36 -36 -29****
  -3 **** -14 -20 -22 -31 -54 -66 -66 -95-100-106-146************************-321-229-182-146 -98 -88 -71 -47 -36 -36 -29****
 -10 ****   0   0   0   0  -6 -15  -4 -10 -30 -40 -74-225****************-385-198-109 -73 -48 -37 -43 -29 -10  -1  -5  -6****
```

```
 -17 ****   0   0   0   0  -3   0  -2 -35 -73 -63 -62-146-308********-390-215 -96 -82 -83 -48 -15  -9 -14   0   0   0  -8****
 -24 ****   0   0   0   0 -26 -29 -57 -68 -61 -37 -63-108-135-263-264-132 -80 -36 -25 -41 -45 -41 -18 -17   0   0   0  -4****
 -31 ****   0 -16  -6 -12 -56 -51 -64 -44 -15 -33 -77 -75 -54-144-125 -13 -36 -54 -27  -5 -24 -47 -38 -44   0   0  -9   0****
 -38 ********  -3 -38 -20 -63 -17 -15   0   0 -51 -69 -43 -35 -91 -92 -20 -21 -48 -42   0   0  -6 -13 -61 -16 -33   0********
 -45 ******** -15 -35  -7 -22   0   0  -5 -27 -72 -41 -11 -19 -75 -84 -19   0 -21 -57 -23   0   0   0 -21  -9 -39 -15********
 -52 ************   0  -9   0   0 -19 -21 -48 -51  -9   0 -24 -42 -43 -21   0   0 -39 -42 -13  -4   0   0  -7  -2************
 -59 ************   0   0   0 -24  -3  -7 -28 -15   0  -4 -40 -38 -32 -31  -1   0  -5 -22  -4   0  -9   0   0   0************
 -66 ****************   0 -17   0  -6 -49 -50 -17 -11 -23 -28 -23 -15 -15 -19  -7  -9 -43 -46  -1   0  -4   0****************
 -72 ********************   0  -8 -37 -10   0   0   0   0  -8   0   0   0   0   0   0   0  -4 -34   0   0********************
 -79 ************************  -7 -11 -20  -7   0   0   0   0   0   0   0   0   0   0   0 -12  -6  -6************************
 -86 ********************************   0   0 -12  -6  -1  -5   0   0   0   0  -4  -8   0   0********************************
 -93 ****************************************   0 -10 -22  -7   0   0   0 -14  -6   0****************************************
-100 ************************************************************************************************************************
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ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
-1,0,2,18,21,41,36,20.,5.32E-5,2.27E-4,
9,9,9,9,9.9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9.
 0.0,-0.1,-0.2,-0.5,-0.8,-1.3,-1.9,-3.0,-5.0,
-5.0,-3.0,-1.9,-1.3,-0.8,-0.5,-0.2,-0.1, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,-8.0,
-5.5,-2.6,-1.6,-0.9,-0.5,-.25,-0.1,-.05, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.3,-1.9,-2.7,-4.1,-8.0,
-6.0,-3.8,-2.7,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.3,-0.5,-0.9,-1.6,-2.8,-7.0,
-3.6,-2.0,-1.1,-0.6,-0.3,-0.2,-0.1,-.05, 0.0,
 0.0,-0.2,-0.5,-0.9,-1.4,-2.0,-2.9,-4.1,-9.0,
-6.0,-3.6,-2.4,-1.7,-1.1,-0.7,-0.4,-0.2, 0.0,
 0.0,-0.2,-.45,-0.8,-1.3,-1.8,-2.5,-3.7,-7.0,
-4.0,-2.1,-1.3,-0.9,-0.6,-0.3,-0.2,-0.1, 0.0,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.2,-1.8,-3.0,-5.5,
-4.0,-2.8,-2.0,-1.5,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-0.6,-1.0,-1.6,-2.2,-3.0,-4.2,-7.0,
-4.2,-3.4,-2.8,-2.2,-1.7,-1.1,-0.6,-0.2, 0.0,
 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.5,-2.8,-4.8,
-3.7,-2.7,-2.0,-1.4,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-2.1,-3.4,-5.0,
-3.5,-2.5,-1.7,-1.2,-0.8,-0.5,-0.3,-0.2, 0.0,
 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.5,-2.8,-4.8,
-3.7,-2.7,-2.0,-1.4,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-0.6,-1.0,-1.6,-2.2,-3.0,-4.2,-7.0,
-4.2,-3.4,-2.8,-2.2,-1.7,-1.1,-0.6,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.2,-1.8,-3.0,-5.5,
-4.0,-2.8,-2.0,-1.5,-1.0,-0.6,-0.3,-0.1, 0.0,
 0.0,-0.2,-.45,-0.8,-1.3,-1.8,-2.5,-3.7,-7.0,
-4.0,-2.1,-1.3,-0.9,-0.6,-0.3,-0.2,-0.1, 0.0,
 0.0,-0.2,-0.5,-0.9,-1.4,-2.0,-2.9,-4.1,-9.0,
-6.0,-3.6,-2.4,-1.7,-1.1,-0.7,-0.4,-0.2, 0.0,
 0.0,-0.1,-0.2,-0.3,-0.5,-0.9,-1.6,-2.8,-7.0,
-3.6,-2.0,-1.1,-0.6,-0.3,-0.2,-0.1,-.05, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.3,-1.9,-2.7,-4.1,-8.0,
-6.0,-3.8,-2.7,-2.0,-1.4,-0.9,-0.5,-0.2, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,-8.0,
-5.5,-2.6,-1.6,-0.9,-0.5,-.25,-0.1,-.05, 0.0,

End of file
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ORIGINAL PAGE IS
OF POOR QUALITY

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 10.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 21

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	-0.1	-0.2	-0.5	-0.8	-1.3	-1.9	-3.0	-5.0***************	-5.0	-3.0	-1.9	-1.3	-0.8	-0.5	-0.2	-0.1	0.0
2	0.0	-0.1	-0.2	-0.5	-0.8	-1.4	-2.0	-3.1	-6.7***************	-4.4	-2.5	-1.4	-0.8	-0.5	-0.3	-0.1	-0.1	0.0
3	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-1.9	-3.0	-8.0***************	-5.5	-2.6	-1.6	-0.9	-0.5	-0.3	-0.1	-0.1	0.0
4	0.0	-0.0	-0.2	-0.5	-0.9	-1.5	-2.2	-3.5	-8.4***************	-6.6	-3.5	-2.4	-1.7	-1.1	-0.6	-0.4	-0.1	0.0
5	0.0	-0.1	-0.4	-0.8	-1.3	-1.9	-2.7	-4.1	-8.0***************	-6.0	-3.8	-2.7	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
6	0.0	-0.1	-0.4	-0.7	-1.1	-1.6	-2.4	-3.7	-7.3***************	-4.2	-2.8	-1.8	-1.3	-0.9	-0.6	-0.3	-0.1	0.0
7	0.0	-0.1	-0.2	-0.3	-0.5	-0.9	-1.6	-2.8	-7.0***************	-3.6	-2.0	-1.1	-0.6	-0.3	-0.2	-0.1	-0.1	0.0
8	0.0	-0.1	-0.2	-0.3	-0.6	-1.0	-1.8	-2.9	-7.8***************	-4.9	-2.7	-1.6	-1.0	-0.5	-0.3	-0.2	-0.1	0.0
9	0.0	-0.2	-0.5	-0.9	-1.4	-2.0	-2.9	-4.1	-9.0***************	-6.0	-3.6	-2.4	-1.7	-1.1	-0.7	-0.4	-0.2	0.0
10	0.0	-0.3	-0.7	-1.2	-1.9	-2.5	-3.4	-4.7	-8.8***************	-5.4	-3.2	-2.2	-1.6	-1.1	-0.7	-0.4	-0.2	0.0
11	0.0	-0.2	-0.4	-0.8	-1.3	-1.8	-2.5	-3.7	-7.0***************	-4.0	-2.1	-1.3	-0.9	-0.6	-0.3	-0.2	-0.1	0.0
12	0.0	-0.1	-0.1	-0.3	-0.6	-0.9	-1.5	-2.7	-5.3***************	-3.5	-1.9	-1.2	-0.8	-0.5	-0.2	-0.1	-0.0	0.0
13	0.0	-0.1	-0.2	-0.5	-0.8	-1.2	-1.8	-3.0	-5.5***************	-4.0	-2.8	-2.0	-1.5	-1.0	-0.6	-0.3	-0.1	0.0
14	0.0	-0.2	-0.5	-1.0	-1.5	-2.1	-2.8	-4.0	-6.7***************	-4.4	-3.5	-2.8	-2.2	-1.6	-1.0	-0.6	-0.2	0.0
15	0.0	-0.2	-0.6	-1.0	-1.6	-2.2	-3.0	-4.2	-7.0***************	-4.2	-3.4	-2.8	-2.2	-1.7	-1.1	-0.6	-0.2	0.0
16	0.0	-0.1	-0.3	-0.5	-0.8	-1.3	-2.1	-3.4	-5.9***************	-3.9	-3.0	-2.4	-1.8	-1.4	-0.8	-0.4	-0.1	0.0
17	0.0	0.0	0.0	-0.1	-0.3	-0.7	-1.5	-2.8	-4.8***************	-3.7	-2.7	-2.0	-1.4	-1.0	-0.6	-0.3	-0.1	0.0
18	0.0	0.0	-0.0	-0.2	-0.5	-0.9	-1.8	-3.1	-4.8***************	-3.6	-2.6	-1.8	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
19	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-2.1	-3.4	-5.0***************	-3.5	-2.5	-1.7	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
20	0.0	0.0	-0.0	-0.2	-0.5	-0.9	-1.8	-3.1	-4.8***************	-3.6	-2.6	-1.8	-1.2	-0.8	-0.5	-0.3	-0.2	0.0
21	0.0	0.0	0.0	-0.1	-0.3	-0.7	-1.5	-2.8	-4.8***************	-3.7	-2.7	-2.0	-1.4	-1.0	-0.6	-0.3	-0.1	0.0
22	0.0	-0.1	-0.3	-0.5	-0.8	-1.3	-2.1	-3.4	-5.9***************	-3.9	-3.0	-2.4	-1.8	-1.4	-0.8	-0.4	-0.1	0.0
23	0.0	-0.2	-0.6	-1.0	-1.6	-2.2	-3.0	-4.2	-7.0***************	-4.2	-3.4	-2.8	-2.2	-1.7	-1.1	-0.6	-0.2	0.0
24	0.0	-0.2	-0.5	-1.0	-1.5	-2.1	-2.8	-4.0	-6.7***************	-4.4	-3.5	-2.8	-2.2	-1.6	-1.0	-0.6	-0.2	0.0
25	0.0	-0.1	-0.2	-0.5	-0.8	-1.2	-1.8	-3.0	-5.5***************	-4.0	-2.8	-2.0	-1.5	-1.0	-0.6	-0.3	-0.1	0.0
26	0.0	-0.1	-0.1	-0.3	-0.6	-0.9	-1.5	-2.7	-5.3***************	-3.5	-1.9	-1.2	-0.8	-0.5	-0.2	-0.1	-0.0	0.0
27	0.0	-0.2	-0.4	-0.8	-1.3	-1.8	-2.5	-3.7	-7.0***************	-4.0	-2.1	-1.3	-0.9	-0.6	-0.3	-0.2	-0.1	0.0
28	0.0	-0.3	-0.7	-1.2	-1.9	-2.5	-3.4	-4.7	-8.8***************	-5.4	-3.2	-2.2	-1.6	-1.1	-0.7	-0.4	-0.2	0.0
29	0.0	-0.2	-0.5	-0.9	-1.4	-2.0	-2.9	-4.1	-9.0***************	-6.0	-3.6	-2.4	-1.7	-1.1	-0.7	-0.4	-0.2	0.0
30	0.0	-0.1	-0.2	-0.3	-0.6	-1.0	-1.8	-2.9	-7.8***************	-4.9	-2.7	-1.6	-1.0	-0.5	-0.3	-0.2	-0.1	0.0
31	0.0	-0.1	-0.2	-0.3	-0.5	-0.9	-1.6	-2.8	-7.0***************	-3.6	-2.0	-1.1	-0.6	-0.3	-0.2	-0.1	-0.1	0.0
32	0.0	-0.1	-0.4	-0.7	-1.1	-1.6	-2.4	-3.7	-7.3***************	-4.2	-2.8	-1.8	-1.3	-0.9	-0.6	-0.3	-0.1	0.0
33	0.0	-0.1	-0.4	-0.8	-1.3	-1.9	-2.7	-4.1	-8.0***************	-6.0	-3.8	-2.7	-2.0	-1.4	-0.9	-0.5	-0.2	0.0
34	0.0	-0.0	-0.2	-0.5	-0.9	-1.5	-2.2	-3.5	-8.4***************	-6.6	-3.5	-2.4	-1.7	-1.1	-0.6	-0.4	-0.1	0.0
35	0.0	0.0	-0.1	-0.3	-0.7	-1.2	-1.9	-3.0	-8.0***************	-5.5	-2.6	-1.6	-0.9	-0.5	-0.3	-0.1	-0.1	0.0

36 0.0 -0.1 -0.2 -0.5 -0.8 -1.4 -2.0 -3.1 -6.7*************** -4.4 -2.5 -1.4 -0.8 -0.5 -0.3 -0.1 -0.1 0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1	0.4506E-01	0.1286E+01
2	0.2250E-01	0.7823E+00
3	0.2330E-01	0.7376E+00
4	0.2797E-01	0.7891E+00

RESULT IS FROM ITERATION: 3
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 14.3

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.4590E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	100.00	**********	5.00	100.00	**********	10.00	100.00	**********	15.00	100.00	**********
	95.00	-66.78		95.00	-46.82		95.00	-21.56		95.00	-14.35
	90.00	-75.55		90.00	-52.63		90.00	-22.82		90.00	-14.02
	85.00	-87.77		85.00	-62.32		85.00	-28.11		85.00	-17.24
	80.00	-96.90		80.00	-70.39		80.00	-33.54		80.00	-20.30
	75.00	-98.89		75.00	-72.40		75.00	-33.01		75.00	-16.27
	70.00	-104.83		70.00	-78.65		70.00	-35.97		70.00	-15.02
	65.00	-109.84		65.00	-85.62		65.00	-42.93		65.00	-18.21
	60.00	-107.56		60.00	-85.63		60.00	-43.30		60.00	-15.07
	55.00	-115.13		55.00	-93.22		55.00	-50.81		55.00	-22.41
	50.00	-138.12		50.00	-115.87		50.00	-72.40		50.00	-44.63
	45.00	-173.05		45.00	-148.63		45.00	-99.22		45.00	-67.53
	40.00	-206.16		40.00	-177.56		40.00	-118.08		40.00	-77.11
	35.00	-242.91		35.00	-216.97		35.00	-158.66		35.00	-111.67
	30.00	-285.23		30.00	-262.78		30.00	-216.63		30.00	-174.20
	25.00	-344.86		25.00	-332.32		25.00	-305.35		25.00	-276.37
	20.00	-458.98		20.00	-455.39		20.00	-443.60		20.00	-426.67
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-258.16		-20.00	-254.91		-20.00	-245.20		-20.00	-233.79
	-25.00	-170.53		-25.00	-159.25		-25.00	-137.08		-25.00	-117.17
	-30.00	-143.02		-30.00	-126.34		-30.00	-94.08		-30.00	-68.08
	-35.00	-134.38		-35.00	-115.71		-35.00	-74.91		-35.00	-47.62
	-40.00	-126.00		-40.00	-104.47		-40.00	-60.50		-40.00	-34.49
	-45.00	-120.55		-45.00	-98.98		-45.00	-55.74		-45.00	-32.04
	-50.00	-103.92		-50.00	-80.52		-50.00	-36.19		-50.00	-13.73
	-55.00	-90.87		-55.00	-64.99		-55.00	-18.77		-55.00	0.0
	-60.00	-90.29		-60.00	-63.11		-60.00	-16.42		-60.00	0.0
	-65.00	-93.21		-65.00	-64.72		-65.00	-19.94		-65.00	-6.41
	-70.00	-90.42		-70.00	-60.19		-70.00	-16.42		-70.00	-7.99
	-75.00	-84.86		-75.00	-54.01		-75.00	-12.91		-75.00	-8.85

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ORIGINAL PAGE IS
OF POOR QUALITY

	-80.00	-81.22		-80.00	-51.59		-80.00	-14.46		-80.00	-13.44
	-85.00	-73.04		-85.00	-46.63		-85.00	-14.62		-85.00	-14.59
	-90.00	-62.36		-90.00	-39.20		-90.00	-11.85		-90.00	-12.40
	-95.00	-52.64		-95.00	-32.57		-95.00	-9.18		-95.00	-10.38
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
20.00	100.00	**********	25.00	100.00	**********	30.00	100.00	**********	35.00	100.00	**********
	95.00	-12.84		95.00	-35.39		95.00	-47.41		95.00	-18.54
	90.00	-14.42		90.00	-39.97		90.00	-52.63		90.00	-22.61
	85.00	-18.95		85.00	-46.15		85.00	-58.75		85.00	-27.75
	80.00	-22.23		80.00	-50.20		80.00	-62.64		80.00	-30.48
	75.00	-19.33		75.00	-49.43		75.00	-62.72		75.00	-29.60
	70.00	-20.13		70.00	-51.74		70.00	-64.93		70.00	-31.37
	65.00	-21.77		65.00	-51.97		65.00	-64.77		65.00	-32.08
	60.00	-17.09		60.00	-45.26		60.00	-57.87		60.00	-27.19
	55.00	-22.89		55.00	-46.12		55.00	-54.30		55.00	-25.03
	50.00	-45.47		50.00	-63.82		50.00	-65.42		50.00	-35.81
	45.00	-68.55		45.00	-84.01		45.00	-80.17		45.00	-48.40
	40.00	-74.87		40.00	-88.86		40.00	-82.39		40.00	-48.06
	35.00	-96.99		35.00	-99.12		35.00	-90.29		35.00	-60.97
	30.00	-145.75		30.00	-135.60		30.00	-123.09		30.00	-97.07
	25.00	-250.58		25.00	-234.46		25.00	-222.97		25.00	-210.55
	20.00	-409.04		20.00	-396.46		20.00	-391.14		20.00	-388.78
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-224.55		-20.00	-221.83		-20.00	-228.12		-20.00	-239.39
	-25.00	-103.98		-25.00	-102.86		-25.00	-108.47		-25.00	-115.05
	-30.00	-56.25		-30.00	-63.09		-30.00	-69.52		-30.00	-65.35
	-35.00	-49.67		-35.00	-66.17		-35.00	-72.59		-35.00	-59.52
	-40.00	-45.86		-40.00	-75.60		-40.00	-84.47		-40.00	-58.44
	-45.00	-46.89		-45.00	-83.16		-45.00	-96.74		-45.00	-67.07
	-50.00	-31.00		-50.00	-73.19		-50.00	-90.84		-50.00	-58.17
	-55.00	-17.31		-55.00	-61.78		-55.00	-79.83		-55.00	-44.35
	-60.00	-18.91		-60.00	-62.08		-60.00	-77.67		-60.00	-40.94
	-65.00	-26.58		-65.00	-65.33		-65.00	-76.40		-65.00	-40.80
	-70.00	-28.56		-70.00	-63.28		-70.00	-69.78		-70.00	-35.51
	-75.00	-27.92		-75.00	-60.12		-75.00	-65.11		-75.00	-32.41
	-80.00	-30.19		-80.00	-59.45		-80.00	-63.65		-80.00	-32.69
	-85.00	-27.48		-85.00	-53.33		-85.00	-57.60		-85.00	-28.45
	-90.00	-22.04		-90.00	-45.01		-90.00	-49.79		-90.00	-22.78
	-95.00	-18.27		-95.00	-39.28		-95.00	-44.86		-95.00	-19.56
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
40.00	100.00	**********	45.00	100.00	**********	50.00	100.00	**********	55.00	100.00	**********
	95.00	-2.20		95.00	-2.44		95.00	-20.48		95.00	-43.64
	90.00	-4.71		90.00	-5.54		90.00	-25.30		90.00	-49.89
	85.00	-7.62		85.00	-8.54		85.00	-30.46		85.00	-57.09
	80.00	-7.32		80.00	-8.76		80.00	-33.96		80.00	-62.21
	75.00	-2.43		75.00	-4.80		75.00	-34.41		75.00	-63.17
	70.00	-0.11		70.00	-3.02		70.00	-37.17		70.00	-66.29
	65.00	0.0		65.00	0.0		65.00	-37.20		65.00	-67.59
	60.00	0.0		60.00	0.0		60.00	-31.75		60.00	-63.07
	55.00	0.0		55.00	0.0		55.00	-30.83		55.00	-61.33
	50.00	-7.29		50.00	-9.98		50.00	-43.61		50.00	-71.44
	45.00	-21.20		45.00	-25.54		45.00	-57.34		45.00	-81.19
	40.00	-18.96		40.00	-22.80		40.00	-53.03		40.00	-73.16
	35.00	-33.48		35.00	-30.31		35.00	-49.30		35.00	-63.10

ORIGINAL PAGE IS
OF POOR QUALITY

60.00		65.00		70.00		75.00	
30.00	-78.47	30.00	-71.17	30.00	-73.89	30.00	-78.85
25.00	-202.50	25.00	-197.98	25.00	-195.99	25.00	-194.22
20.00	-388.63	20.00	-390.47	20.00	-394.61	20.00	-397.72
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	-254.01	-20.00	-270.27	-20.00	-287.74	-20.00	-303.67
-25.00	-126.07	-25.00	-137.88	-25.00	-149.13	-25.00	-159.76
-30.00	-69.10	-30.00	-81.28	-30.00	-98.49	-30.00	-111.90
-35.00	-47.82	-35.00	-57.92	-35.00	-85.46	-35.00	-102.86
-40.00	-30.68	-40.00	-35.91	-40.00	-70.91	-40.00	-96.32
-45.00	-30.41	-45.00	-29.24	-45.00	-66.31	-45.00	-98.70
-50.00	-15.53	-50.00	-11.28	-50.00	-51.41	-50.00	-89.03
-55.00	0.0	-55.00	0.0	-55.00	-36.68	-55.00	-75.27
-60.00	0.0	-60.00	0.0	-60.00	-35.39	-60.00	-71.35
-65.00	-6.79	-65.00	-7.72	-65.00	-41.90	-65.00	-73.10
-70.00	-11.47	-70.00	-15.97	-70.00	-43.41	-70.00	-69.48
-75.00	-15.51	-75.00	-20.60	-75.00	-42.16	-75.00	-66.20
-80.00	-20.48	-80.00	-25.19	-80.00	-42.80	-80.00	-65.91
-85.00	-18.95	-85.00	-23.16	-85.00	-38.60	-85.00	-60.77
-90.00	-15.68	-90.00	-19.22	-90.00	-32.34	-90.00	-53.21
-95.00	-13.23	-95.00	-15.42	-95.00	-26.90	-95.00	-47.08
-100.00	**********	-100.00	**********	-100.00	**********	-100.00	**********
100.00	**********	100.00	**********	100.00	**********	100.00	**********
95.00	-26.73	95.00	-5.62	95.00	-11.06	95.00	-20.04
90.00	-32.65	90.00	-9.53	90.00	-13.77	90.00	-23.30
85.00	-40.37	85.00	-15.21	85.00	-17.67	85.00	-27.76
80.00	-45.19	80.00	-18.06	80.00	-19.47	80.00	-30.32
75.00	-44.77	75.00	-15.44	75.00	-15.76	75.00	-28.00
70.00	-47.06	70.00	-14.69	70.00	-12.01	70.00	-25.92
65.00	-47.75	65.00	-11.59	65.00	-5.52	65.00	-21.54
60.00	-42.83	60.00	-2.86	60.00	0.0	60.00	-12.27
55.00	-43.07	55.00	-2.78	55.00	0.0	55.00	-10.14
50.00	-55.74	50.00	-18.51	50.00	-4.65	50.00	-24.29
45.00	-66.15	45.00	-31.19	45.00	-16.91	45.00	-36.84
40.00	-58.19	40.00	-24.04	40.00	-8.98	40.00	-29.15
35.00	-50.56	35.00	-24.30	35.00	-13.36	35.00	-34.10
30.00	-66.31	30.00	-49.73	30.00	-49.61	30.00	-72.02
25.00	-187.28	25.00	-182.56	25.00	-190.24	25.00	-210.89
20.00	-397.06	20.00	-401.27	20.00	-415.28	20.00	-434.45
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
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-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	-316.24	-20.00	-333.51	-20.00	-360.97	-20.00	-394.54
-25.00	-165.07	-25.00	-170.78	-25.00	-185.51	-25.00	-210.89
-30.00	-103.66	-30.00	-89.85	-30.00	-90.88	-30.00	-109.81
-35.00	-90.98	-35.00	-63.34	-35.00	-48.84	-35.00	-62.65
-40.00	-83.52	-40.00	-49.59	-40.00	-30.80	-40.00	-41.07
-45.00	-87.67	-45.00	-51.87	-45.00	-32.76	-45.00	-42.27
-50.00	-76.76	-50.00	-36.64	-50.00	-17.60	-50.00	-29.97
-55.00	-60.42	-55.00	-16.69	-55.00	0.0	-55.00	-16.00
-60.00	-55.04	-60.00	-12.17	-60.00	0.0	-60.00	-16.11

	-65.00	-57.42		-65.00	-20.25		-65.00	-8.78		-65.00	-25.41
	-70.00	-54.54		-70.00	-23.15		-70.00	-15.62		-70.00	-29.93
	-75.00	-51.86		-75.00	-23.68		-75.00	-18.80		-75.00	-31.09
	-80.00	-51.84		-80.00	-25.37		-80.00	-22.02		-80.00	-33.06
	-85.00	-46.36		-85.00	-21.47		-85.00	-19.71		-85.00	-30.23
	-90.00	-39.31		-90.00	-17.29		-90.00	-17.23		-90.00	-26.23
	-95.00	-34.09		-95.00	-14.45		-95.00	-15.33		-95.00	-22.93
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
80.00	100.00	**********	85.00	100.00	**********	90.00	100.00	**********	95.00	100.00	**********
	95.00	-31.90		95.00	-34.24		95.00	-33.34		95.00	-44.91
	90.00	-36.02		90.00	-39.45		90.00	-39.46		90.00	-51.16
	85.00	-40.81		85.00	-44.51		85.00	-45.19		85.00	-57.02
	80.00	-42.91		80.00	-46.42		80.00	-47.98		80.00	-59.97
	75.00	-40.74		75.00	-44.93		75.00	-47.99		75.00	-59.13
	70.00	-40.29		70.00	-45.94		70.00	-50.14		70.00	-59.41
	65.00	-38.42		65.00	-44.62		65.00	-48.34		65.00	-56.46
	60.00	-32.14		60.00	-38.78		60.00	-41.81		60.00	-48.48
	55.00	-36.04		55.00	-46.87		55.00	-48.15		55.00	-50.40
	50.00	-55.82		50.00	-71.78		50.00	-71.24		50.00	-67.06
	45.00	-71.78		45.00	-92.41		45.00	-92.74		45.00	-83.18
	40.00	-68.31		40.00	-97.42		40.00	-104.13		40.00	-91.93
	35.00	-76.86		35.00	-116.59		35.00	-134.57		35.00	-125.34
	30.00	-117.58		30.00	-161.93		30.00	-182.56		30.00	-177.20
	25.00	-242.50		25.00	-272.51		25.00	-285.53		25.00	-275.32
	20.00	-450.04		20.00	-455.98		20.00	-453.51		20.00	-444.37
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
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	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-425.01		-20.00	-444.37		-20.00	-453.51		-20.00	-455.98
	-25.00	-245.33		-25.00	-275.32		-25.00	-285.53		-25.00	-272.51
	-30.00	-146.25		-30.00	-177.20		-30.00	-182.56		-30.00	-161.93
	-35.00	-95.64		-35.00	-125.34		-35.00	-134.57		-35.00	-116.59
	-40.00	-67.63		-40.00	-91.93		-40.00	-104.13		-40.00	-97.42
	-45.00	-65.32		-45.00	-83.18		-45.00	-92.74		-45.00	-92.41
	-50.00	-53.75		-50.00	-67.06		-50.00	-71.24		-50.00	-71.78
	-55.00	-41.38		-55.00	-50.40		-55.00	-48.15		-55.00	-46.87
	-60.00	-41.87		-60.00	-48.48		-60.00	-41.81		-60.00	-38.78
	-65.00	-49.69		-65.00	-56.46		-65.00	-48.34		-65.00	-44.62
	-70.00	-52.67		-70.00	-59.41		-70.00	-50.14		-70.00	-45.94
	-75.00	-53.12		-75.00	-59.13		-75.00	-47.99		-75.00	-44.93
	-80.00	-54.60		-80.00	-59.97		-80.00	-47.98		-80.00	-46.42
	-85.00	-51.55		-85.00	-57.02		-85.00	-45.19		-85.00	-44.51
	-90.00	-46.04		-90.00	-51.16		-90.00	-39.46		-90.00	-39.45
	-95.00	-40.81		-95.00	-44.91		-95.00	-33.34		-95.00	-34.24
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
100.00	100.00	**********	105.00	100.00	**********	110.00	100.00	**********	115.00	100.00	**********
	95.00	-40.81		95.00	-22.93		95.00	-15.33		95.00	-14.45
	90.00	-46.04		90.00	-26.23		90.00	-17.23		90.00	-17.29
	85.00	-51.55		85.00	-30.23		85.00	-19.71		85.00	-21.47
	80.00	-54.60		80.00	-33.06		80.00	-22.02		80.00	-25.37
	75.00	-53.12		75.00	-31.09		75.00	-18.80		75.00	-23.68
	70.00	-52.67		70.00	-29.93		70.00	-15.62		70.00	-23.15
	65.00	-49.69		65.00	-25.41		65.00	-8.78		65.00	-20.25
	60.00	-41.87		60.00	-16.11		60.00	0.0		60.00	-12.17
	55.00	-41.38		55.00	-16.00		55.00	0.0		55.00	-16.69
	50.00	-53.75		50.00	-29.97		50.00	-17.60		50.00	-36.64

	45.00	-65.32		45.00	-42.27		45.00	-32.76		45.00	-51.87
	40.00	-67.63		40.00	-41.07		40.00	-30.80		40.00	-49.59
	35.00	-95.64		35.00	-62.65		35.00	-48.84		35.00	-63.34
	30.00	-146.25		30.00	-109.81		30.00	-90.88		30.00	-89.85
	25.00	-245.33		25.00	-210.89		25.00	-185.51		25.00	-170.78
	20.00	-425.01		20.00	-394.54		20.00	-360.97		20.00	-333.51
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
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	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-450.04		-20.00	-434.45		-20.00	-415.28		-20.00	-401.27
	-25.00	-242.50		-25.00	-210.89		-25.00	-190.24		-25.00	-182.56
	-30.00	-117.58		-30.00	-72.02		-30.00	-49.61		-30.00	-49.73
	-35.00	-76.86		-35.00	-34.10		-35.00	-13.36		-35.00	-24.30
	-40.00	-68.31		-40.00	-29.15		-40.00	-8.98		-40.00	-24.04
	-45.00	-71.78		-45.00	-36.84		-45.00	-16.91		-45.00	-31.19
	-50.00	-55.82		-50.00	-24.29		-50.00	-4.65		-50.00	-18.51
	-55.00	-36.04		-55.00	-10.14		-55.00	0.0		-55.00	-2.78
	-60.00	-32.14		-60.00	-12.27		-60.00	0.0		-60.00	-2.86
	-65.00	-38.42		-65.00	-21.54		-65.00	-5.52		-65.00	-11.59
	-70.00	-40.29		-70.00	-25.92		-70.00	-12.01		-70.00	-14.69
	-75.00	-40.74		-75.00	-28.00		-75.00	-15.76		-75.00	-15.44
	-80.00	-42.91		-80.00	-30.32		-80.00	-19.47		-80.00	-18.06
	-85.00	-40.81		-85.00	-27.76		-85.00	-17.67		-85.00	-15.21
	-90.00	-36.02		-90.00	-23.30		-90.00	-13.77		-90.00	-9.53
	-95.00	-31.90		-95.00	-20.04		-95.00	-11.06		-95.00	-5.62
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
120.00	100.00	**********	125.00	100.00	**********	130.00	100.00	**********	135.00	100.00	**********
	95.00	-34.09		95.00	-47.08		95.00	-26.90		95.00	-15.42
	90.00	-39.31		90.00	-53.21		90.00	-32.34		90.00	-19.22
	85.00	-46.36		85.00	-60.77		85.00	-38.60		85.00	-23.16
	80.00	-51.84		80.00	-65.91		80.00	-42.80		80.00	-25.19
	75.00	-51.86		75.00	-66.20		75.00	-42.16		75.00	-20.60
	70.00	-54.54		70.00	-69.48		70.00	-43.41		70.00	-15.97
	65.00	-57.42		65.00	-73.10		65.00	-41.90		65.00	-7.72
	60.00	-55.04		60.00	-71.35		60.00	-35.39		60.00	0.0
	55.00	-60.42		55.00	-75.27		55.00	-36.68		55.00	0.0
	50.00	-76.76		50.00	-89.03		50.00	-51.41		50.00	-11.28
	45.00	-87.67		45.00	-98.70		45.00	-66.31		45.00	-29.24
	40.00	-83.52		40.00	-96.32		40.00	-70.91		40.00	-35.91
	35.00	-90.98		35.00	-102.86		35.00	-85.46		35.00	-57.92
	30.00	-103.66		30.00	-111.90		30.00	-98.49		30.00	-81.28
	25.00	-165.07		25.00	-159.76		25.00	-149.13		25.00	-137.88
	20.00	-316.24		20.00	-303.67		20.00	-287.74		20.00	-270.27
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
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	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-397.06		-20.00	-397.72		-20.00	-394.61		-20.00	-390.47
	-25.00	-187.28		-25.00	-194.22		-25.00	-195.99		-25.00	-197.98
	-30.00	-66.31		-30.00	-78.85		-30.00	-73.89		-30.00	-71.17
	-35.00	-50.56		-35.00	-63.10		-35.00	-49.30		-35.00	-30.31
	-40.00	-58.19		-40.00	-73.16		-40.00	-53.03		-40.00	-22.80
	-45.00	-66.15		-45.00	-81.19		-45.00	-57.34		-45.00	-25.54

	-50.00	-55.74		-50.00	-71.44		-50.00	-43.61		-50.00	-9.98
	-55.00	-43.07		-55.00	-61.33		-55.00	-30.83		-55.00	0.0
	-60.00	-42.83		-60.00	-63.07		-60.00	-31.75		-60.00	0.0
	-65.00	-47.75		-65.00	-67.59		-65.00	-37.20		-65.00	0.0
	-70.00	-47.06		-70.00	-66.29		-70.00	-37.17		-70.00	-3.02
	-75.00	-44.77		-75.00	-63.17		-75.00	-34.41		-75.00	-4.80
	-80.00	-45.19		-80.00	-62.21		-80.00	-33.96		-80.00	-8.76
	-85.00	-40.37		-85.00	-57.09		-85.00	-30.46		-85.00	-8.54
	-90.00	-32.65		-90.00	-49.89		-90.00	-25.30		-90.00	-5.54
	-95.00	-26.73		-95.00	-43.64		-95.00	-20.48		-95.00	-2.44
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
140.00	100.00	**********	145.00	100.00	**********	150.00	100.00	**********	155.00	100.00	**********
	95.00	-13.23		95.00	-19.56		95.00	-44.86		95.00	-39.28
	90.00	-15.68		90.00	-22.78		90.00	-49.79		90.00	-45.01
	85.00	-18.95		85.00	-28.45		85.00	-57.60		85.00	-53.33
	80.00	-20.48		80.00	-32.69		80.00	-63.65		80.00	-59.45
	75.00	-15.51		75.00	-32.41		75.00	-65.11		75.00	-60.12
	70.00	-11.47		70.00	-35.51		70.00	-69.78		70.00	-63.28
	65.00	-6.79		65.00	-40.80		65.00	-76.40		65.00	-65.33
	60.00	0.0		60.00	-40.94		60.00	-77.67		60.00	-62.08
	55.00	0.0		55.00	-44.35		55.00	-79.83		55.00	-61.78
	50.00	-15.53		50.00	-58.17		50.00	-90.84		50.00	-73.19
	45.00	-30.41		45.00	-67.07		45.00	-96.74		45.00	-83.16
	40.00	-30.68		40.00	-58.44		40.00	-84.47		40.00	-75.60
	35.00	-47.82		35.00	-59.52		35.00	-72.59		35.00	-66.17
	30.00	-69.10		30.00	-65.35		30.00	-69.52		30.00	-63.09
	25.00	-126.07		25.00	-115.05		25.00	-108.47		25.00	-102.86
	20.00	-254.01		20.00	-239.39		20.00	-228.12		20.00	-221.83
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-388.63		-20.00	-388.78		-20.00	-391.14		-20.00	-396.46
	-25.00	-202.50		-25.00	-210.55		-25.00	-222.97		-25.00	-234.46
	-30.00	-78.47		-30.00	-97.07		-30.00	-123.09		-30.00	-135.60
	-35.00	-33.48		-35.00	-60.97		-35.00	-90.29		-35.00	-99.12
	-40.00	-18.96		-40.00	-48.06		-40.00	-82.39		-40.00	-88.86
	-45.00	-21.20		-45.00	-48.40		-45.00	-80.17		-45.00	-84.01
	-50.00	-7.29		-50.00	-35.81		-50.00	-65.42		-50.00	-63.82
	-55.00	0.0		-55.00	-25.03		-55.00	-54.30		-55.00	-46.12
	-60.00	0.0		-60.00	-27.19		-60.00	-57.87		-60.00	-45.26
	-65.00	0.0		-65.00	-32.08		-65.00	-64.77		-65.00	-51.97
	-70.00	-0.11		-70.00	-31.37		-70.00	-64.93		-70.00	-51.74
	-75.00	-2.43		-75.00	-29.60		-75.00	-62.72		-75.00	-49.43
	-80.00	-7.32		-80.00	-30.48		-80.00	-62.64		-80.00	-50.20
	-85.00	-7.62		-85.00	-27.75		-85.00	-58.75		-85.00	-46.15
	-90.00	-4.71		-90.00	-22.61		-90.00	-52.63		-90.00	-39.97
	-95.00	-2.20		-95.00	-18.54		-95.00	-47.41		-95.00	-35.39
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
160.00	100.00	**********	165.00	100.00	**********	170.00	100.00	**********	175.00	100.00	**********
	95.00	-18.27		95.00	-10.38		95.00	-9.18		95.00	-32.57
	90.00	-22.04		90.00	-12.40		90.00	-11.85		90.00	-39.20
	85.00	-27.48		85.00	-14.59		85.00	-14.62		85.00	-46.63
	80.00	-30.19		80.00	-13.44		80.00	-14.46		80.00	-51.59
	75.00	-27.92		75.00	-8.85		75.00	-12.91		75.00	-54.01
	70.00	-28.56		70.00	-7.99		70.00	-16.42		70.00	-60.19
	65.00	-26.58		65.00	-6.41		65.00	-19.94		65.00	-64.72

60.00	-18.91	60.00	0.0	60.00	-16.42	60.00	-63.11
55.00	-17.31	55.00	0.0	55.00	-18.77	55.00	-64.99
50.00	-31.00	50.00	-13.73	50.00	-36.19	50.00	-80.52
45.00	-46.89	45.00	-32.04	45.00	-55.74	45.00	-98.98
40.00	-45.86	40.00	-34.49	40.00	-60.50	40.00	-104.47
35.00	-49.67	35.00	-47.62	35.00	-74.91	35.00	-115.71
30.00	-56.25	30.00	-68.08	30.00	-94.08	30.00	-126.34
25.00	-103.98	25.00	-117.17	25.00	-137.08	25.00	-159.25
20.00	-224.55	20.00	-233.79	20.00	-245.20	20.00	-254.91
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	-409.04	-20.00	-426.67	-20.00	-443.60	-20.00	-455.39
-25.00	-250.58	-25.00	-276.37	-25.00	-305.35	-25.00	-332.32
-30.00	-145.75	-30.00	-174.20	-30.00	-216.63	-30.00	-262.78
-35.00	-96.99	-35.00	-111.67	-35.00	-158.66	-35.00	-216.97
-40.00	-74.87	-40.00	-77.11	-40.00	-118.08	-40.00	-177.56
-45.00	-68.55	-45.00	-67.53	-45.00	-99.22	-45.00	-148.63
-50.00	-45.47	-50.00	-44.63	-50.00	-72.40	-50.00	-115.87
-55.00	-22.89	-55.00	-22.41	-55.00	-50.81	-55.00	-93.22
-60.00	-17.09	-60.00	-15.07	-60.00	-43.30	-60.00	-85.63
-65.00	-21.77	-65.00	-18.21	-65.00	-42.93	-65.00	-85.62
-70.00	-20.13	-70.00	-15.02	-70.00	-35.97	-70.00	-78.65
-75.00	-19.33	-75.00	-16.27	-75.00	-33.01	-75.00	-72.40
-80.00	-22.23	-80.00	-20.30	-80.00	-33.54	-80.00	-70.39
-85.00	-18.95	-85.00	-17.24	-85.00	-28.11	-85.00	-62.32
-90.00	-14.42	-90.00	-14.02	-90.00	-22.82	-90.00	-52.63
-95.00	-12.84	-95.00	-14.35	-95.00	-21.56	-95.00	-46.82
-100.00	**********	-100.00	**********	-100.00	**********	-100.00	**********

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
1,0,0,18,11,30,36,10.,5.32E-5,2.27E-4,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,[illegible],6,
0.0,0.4,1.2,2.6,4.0,4.9,
4.9,4.0,2.6,1.2,0.4,0.0,
0.0,0.5,1.6,2.7,4.0,4.9,
4.9,4.0,2.8,1.5,0.6,0.0,
0.0,0.3,1.1,2.2,4.0,4.9,
4.9,4.0,2.6,1.5,0.6,0.0,
0.0,0.4,1.3,2.5,4.0,4.9,
4.9,3.9,2.6,1.4,0.5,0.0,
0.0,0.5,1.4,2.7,4.3,4.9,
4.9,4.5,3.3,2.0,0.8,0.0,
0.0,0.2,0.8,1.8,3.5,4.8,
4.8,3.7,2.4,1.2,0.4,0.0,
0.0,0.3,1.3,2.5,4.1,4.8,
4.8,4.0,2.6,1.4,0.5,0.0,
0.0,0.8,1.7,2.8,4.3,4.9,
4.9,4.3,2.8,1.8,0.8,0.0,
0.0,0.5,1.3,2.4,3.7,4.8,
4.8,4.2,3.1,2.0,0.8,0.0,
0.0,0.8,1.7,2.8,4.2,4.9,
4.9,4.0,2.4,1.3,0.4,0.0,
0.0,0.5,1.3,2.4,3.7,4.8,
4.8,4.2,3.1,2.0,0.8,0.0,
0.0,0.8,1.7,2.8,4.3,4.9,
4.9,4.3,2.8,1.8,0.8,0.0,
0.0,0.3,1.3,2.5,4.1,4.8,
4.8,4.0,2.6,1.4,0.5,0.0,
0.0,0.2,0.8,1.8,3.5,4.8,
4.8,3.7,2.4,1.2,0.4,0.0,
0.0,0.5,1.4,2.7,4.3,4.9,
4.9,4.5,3.3,2.0,0.8,0.0,
0.0,0.4,1.3,2.5,4.0,4.9,
4.9,3.9,2.6,1.4,0.5,0.0,
0.0,0.3,1.1,2.2,4.0,4.9,
4.9,4.0,2.6,1.5,0.6,0.0,
0.0,0.5,1.6,2.7,4.0,4.9,
4.9,4.0,2.8,1.5,0.6,0.0,
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ORIGINAL PAGE IS
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 5.000000

INTERPOLATION COEFFICIENT: 0

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 18 NUMBER OF RAYS IN EACH PROJECTION: 11

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	0.4	1.2	2.6	4.0	4.9	4.0	2.6	1.2	0.4	0.0
2	0.0	0.5	1.6	2.7	4.0	4.9	4.0	2.8	1.5	0.6	0.0
3	0.0	0.3	1.1	2.2	4.0	4.9	4.0	2.6	1.5	0.6	0.0
4	0.0	0.4	1.3	2.5	4.0	4.9	3.9	2.6	1.4	0.5	0.0
5	0.0	0.5	1.4	2.7	4.3	4.9	4.5	3.3	2.0	0.8	0.0
6	0.0	0.2	0.8	1.8	3.5	4.8	3.7	2.4	1.2	0.4	0.0
7	0.0	0.3	1.3	2.5	4.1	4.8	4.0	2.6	1.4	0.5	0.0
8	0.0	0.8	1.7	2.8	4.3	4.9	4.3	2.8	1.8	0.8	0.0
9	0.0	0.5	1.3	2.4	3.7	4.8	4.2	3.1	2.0	0.8	0.0
10	0.0	0.8	1.7	2.8	4.2	4.9	4.0	2.4	1.3	0.4	0.0
11	0.0	0.5	1.3	2.4	3.7	4.8	4.2	3.1	2.0	0.8	0.0
12	0.0	0.8	1.7	2.8	4.3	4.9	4.3	2.8	1.8	0.8	0.0
13	0.0	0.3	1.3	2.5	4.1	4.8	4.0	2.6	1.4	0.5	0.0
14	0.0	0.2	0.8	1.8	3.5	4.8	3.7	2.4	1.2	0.4	0.0
15	0.0	0.5	1.4	2.7	4.3	4.9	4.5	3.3	2.0	0.8	0.0
16	0.0	0.4	1.3	2.5	4.0	4.9	3.9	2.6	1.4	0.5	0.0
17	0.0	0.3	1.1	2.2	4.0	4.9	4.0	2.6	1.5	0.6	0.0
18	0.0	0.5	1.6	2.7	4.0	4.9	4.0	2.8	1.5	0.6	0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1 0.7018E-02 0.2260E+00

RESULT IS FROM ITERATION: 1
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2526E+00

X AND Y COORDINATES MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

Y \ X:-500-466-431-397-362-328-293-259-224-190-155-121 -86 -52 -17 17 52 86 121 155 190 224 259 293 328 362 397 431 466 500

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 500 ************************************************************************************************
 466 ********************************    4    5    9    7    7    9   11   13   10    7****************************
 431 **************************    7    8   12   14   16   16   16   17   19   20   16   13    9    9**********************
 397 ********************   11   16   18   19   22   25   27   28   28   28   28   26   23   19   15   15   15   14****************
 362 ****************   11   21   25   29   30   32   36   38   41   42   41   39   36   32   27   23   22   20   18   12************
 328 **************    5   14   25   34   39   42   43   47   51   55   56   55   51   46   42   37   35   32   27   21   13    5**********
 293 ***********    3   11   20   30   41   48   52   56   59   64   70   71   69   66   59   54   50   47   42   35   25   17   10    4********
 259 ***********   13   19   28   38   49   60   65   71   75   81   87   89   87   81   73   68   65   60   54   43   32   24   16   11********
 224 ********   12   22   29   38   47   59   69   81   88   95  101  106  109  105   98   91   84   78   72   61   51   39   30   23   18   11*****
 190 ********   16   27   37   48   57   68   80   92  105  114  123  129  132  128  119  108   98   91   80   69   57   46   37   29   21   12*****
 155 ****    9   20   31   43   54   65   76   89  103  117  133  144  153  156  154  145  132  117  101   88   76   63   51   40   31   23   15    6****
 121 ****   11   22   33   47   60   72   82   96  112  130  149  164  175  180  179  170  156  137  117   99   84   68   56   45   34   24   15    5****
  86 ****   14   24   36   49   61   77   90  104  120  143  163  182  196  204  204  196  180  158  136  110   92   76   61   47   36   27   16    7****
  52 ****   13   24   37   52   67   81   94  109  127  152  177  199  217  229  229  218  200  177  151  122   99   81   66   52   40   29   16    5****
  17 ****   14   26   38   53   68   83   97  111  132  158  185  209  232  252  253  233  211  187  159  130  103   84   68   55   42   30   17    4****
 -17 ****   14   26   38   53   68   83   97  111  132  158  185  209  232  252  253  233  211  187  159  130  103   84   68   55   42   30   17    4****
 -52 ****   13   24   37   52   67   81   94  109  127  152  177  199  217  229  229  218  200  177  151  122   99   81   66   52   40   29   16    5****
 -86 ****   14   24   36   49   63   77   90  104  120  143  163  182  196  204  204  196  180  158  136  110   92   76   61   47   36   27   16    7****
-121 ****   11   22   33   47   60   72   82   96  112  130  149  164  175  180  179  170  156  137  117   99   84   68   56   45   34   24   15    5****
-155 ****    9   20   31   43   54   65   76   89  103  117  133  144  153  156  154  145  132  117  101   88   76   63   51   40   31   23   15    6****
-190 ********   16   27   37   48   57   68   80   92  105  114  123  129  132  128  119  108   98   91   80   69   57   46   37   29   21   12*****
-224 ********   12   22   29   38   47   59   69   81   88   95  101  106  109  105   98   91   84   78   72   61   51   39   30   23   18   11*****
-259 ***********   13   19   28   38   49   60   65   71   75   81   87   89   87   81   73   68   65   60   54   43   32   24   16   11********
-293 ***********    3   11   20   30   41   48   52   56   59   64   70   71   69   66   59   54   50   47   42   35   25   17   10    4********
-328 **************    5   14   25   34   39   42   43   47   51   55   56   55   51   46   42   37   35   32   27   21   13    5**********
-362 ****************   11   21   25   29   30   32   36   38   41   42   41   39   36   32   27   23   22   20   18   12************
-397 ********************   11   16   18   19   22   25   27   28   28   28   28   26   23   19   15   15   15   14****************
-431 **************************    7    8   12   14   16   16   16   17   19   20   16   13    9    9**********************
-466 ********************************    4    5    9    7    7    9   11   13   10    7****************************
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OF POOR QUALITY

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
-1,0,0,18,11,21,36,10.,5.32E-5,2.27E-4,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,
0.0,0.4,1.2,2.6,4.0,4.9,
4.9,4.0,2.6,1.2,0.4,0.0,
0.0,0.5,1.6,2.7,4.0,4.9,
4.9,4.0,2.8,1.5,0.6,0.0,
0.0,0.3,1.1,2.2,4.0,4.9,
4.9,4.0,2.6,1.5,0.6,0.0,
0.0,0.4,1.3,2.5,4.0,4.9,
4.9,3.9,2.6,1.4,0.5,0.0,
0.0,0.5,1.4,2.7,4.3,4.9,
4.9,4.5,3.3,2.0,0.8,0.0,
0.0,0.2,0.8,1.8,3.5,4.8,
4.8,3.7,2.4,1.2,0.4,0.0,
0.0,0.3,1.3,2.5,4.1,4.8,
4.8,4.0,2.6,1.4,0.5,0.0,
0.0,0.8,1.7,2.8,4.3,4.9,
4.9,4.3,2.8,1.8,0.8,0.0,
0.0,0.5,1.3,2.4,3.7,4.8,
4.8,4.2,3.1,2.0,0.8,0.0,
0.0,0.8,1.7,2.8,4.2,4.9,
4.9,4.0,2.4,1.3,0.4,0.0,
0.0,0.5,1.3,2.4,3.7,4.8,
4.8,4.2,3.1,2.0,0.8,0.0,
0.0,0.8,1.7,2.8,4.3,4.9,
4.9,4.3,2.8,1.8,0.8,0.0,
0.0,0.3,1.3,2.5,4.1,4.8,
4.8,4.0,2.6,1.4,0.5,0.0,
0.0,0.2,0.8,1.8,3.5,4.8,
4.8,3.7,2.4,1.2,0.4,0.0,
0.0,0.5,1.4,2.7,4.3,4.9,
4.9,4.5,3.3,2.0,0.8,0.0,
0.0,0.4,1.3,2.5,4.0,4.9,
4.9,3.9,2.6,1.4,0.5,0.0,
0.0,0.3,1.1,2.2,4.0,4.9,
4.9,4.0,2.6,1.5,0.6,0.0,
0.0,0.5,1.6,2.7,4.0,4.9,
4.9,4.0,2.8,1.5,0.6,0.0,


End of file
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 5.000000

INTERPOLATION COEFFICIENT: 0

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 18 NUMBER OF RAYS IN EACH PROJECTION: 11

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	0.4	1.2	2.6	4.0	4.9	4.0	2.6	1.2	0.4	0.0
2	0.0	0.5	1.6	2.7	4.0	4.9	4.0	2.8	1.5	0.6	0.0
3	0.0	0.3	1.1	2.2	4.0	4.9	4.0	2.6	1.5	0.6	0.0
4	0.0	0.4	1.3	2.5	4.0	4.9	3.9	2.6	1.4	0.5	0.0
5	0.0	0.5	1.4	2.7	4.3	4.9	4.5	3.3	2.0	0.8	0.0
6	0.0	0.2	0.8	1.8	3.5	4.8	3.7	2.4	1.2	0.4	0.0
7	0.0	0.3	1.3	2.5	4.1	4.8	4.0	2.6	1.4	0.5	0.0
8	0.0	0.8	1.7	2.8	4.3	4.9	4.3	2.8	1.8	0.8	0.0
9	0.0	0.5	1.3	2.4	3.7	4.8	4.2	3.1	2.0	0.8	0.0
10	0.0	0.8	1.7	2.8	4.2	4.9	4.0	2.4	1.3	0.4	0.0
11	0.0	0.5	1.3	2.4	3.7	4.8	4.2	3.1	2.0	0.8	0.0
12	0.0	0.8	1.7	2.8	4.3	4.9	4.3	2.8	1.8	0.8	0.0
13	0.0	0.3	1.3	2.5	4.1	4.8	4.0	2.6	1.4	0.5	0.0
14	0.0	0.2	0.8	1.8	3.5	4.8	3.7	2.4	1.2	0.4	0.0
15	0.0	0.5	1.4	2.7	4.3	4.9	4.5	3.3	2.0	0.8	0.0
16	0.0	0.4	1.3	2.5	4.0	4.9	3.9	2.6	1.4	0.5	0.0
17	0.0	0.3	1.1	2.2	4.0	4.9	4.0	2.6	1.5	0.6	0.0
18	0.0	0.5	1.6	2.7	4.0	4.9	4.0	2.8	1.5	0.6	0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1 0.7018E-02 0.2260E+00

RESULT IS FROM ITERATION: 1
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2701E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG R DEG R DEG R DEG R

A79

ORIGINAL PAGE IS
OF POOR QUALITY

0.0	500.00	**********	5.00	500.00	**********	10.00	500.00	**********	15.00	500.00	**********
	450.00	10.81		450.00	10.08		450.00	13.95		450.00	13.70
	400.00	29.57		400.00	28.93		400.00	28.62		400.00	28.18
	350.00	48.15		350.00	45.67		350.00	45.91		350.00	42.71
	300.00	66.40		300.00	64.53		300.00	64.44		300.00	63.14
	250.00	89.37		250.00	88.31		250.00	88.69		250.00	87.43
	200.00	121.84		200.00	121.22		200.00	121.94		200.00	119.31
	150.00	165.00		150.00	164.01		150.00	163.80		150.00	162.66
	100.00	203.11		100.00	202.72		100.00	202.83		100.00	202.08
	50.00	236.60		50.00	236.40		50.00	236.46		50.00	236.08
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	235.87		-50.00	235.68		-50.00	235.74		-50.00	235.38
	-100.00	201.67		-100.00	201.28		-100.00	201.41		-100.00	200.68
	-150.00	163.43		-150.00	162.62		-150.00	162.78		-150.00	162.43
	-200.00	125.06		-200.00	124.93		-200.00	125.95		-200.00	124.80
	-250.00	101.22		-250.00	100.01		-250.00	100.51		-250.00	99.11
	-300.00	81.56		-300.00	80.41		-300.00	80.39		-300.00	79.10
	-350.00	59.23		-350.00	57.75		-350.00	59.32		-350.00	58.08
	-400.00	37.41		-400.00	36.37		-400.00	38.31		-400.00	38.12
	-450.00	20.34		-450.00	18.95		-450.00	21.52		-450.00	20.89
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
20.00	500.00	**********	25.00	500.00	**********	30.00	500.00	**********	35.00	500.00	**********
	450.00	17.17		450.00	17.68		450.00	19.79		450.00	15.41
	400.00	29.19		400.00	30.06		400.00	30.82		400.00	28.65
	350.00	45.00		350.00	44.19		350.00	46.27		350.00	45.18
	300.00	63.70		300.00	62.75		300.00	63.79		300.00	64.43
	250.00	87.44		250.00	85.88		250.00	86.45		250.00	85.45
	200.00	118.01		200.00	116.53		200.00	116.41		200.00	114.34
	150.00	162.32		150.00	160.61		150.00	159.49		150.00	156.99
	100.00	201.84		100.00	200.99		100.00	200.66		100.00	199.46
	50.00	235.96		50.00	235.53		50.00	235.37		50.00	234.77
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	235.28		-50.00	234.88		-50.00	234.75		-50.00	234.18
	-100.00	200.48		-100.00	199.68		-100.00	199.41		-100.00	198.28
	-150.00	163.07		-150.00	162.84		-150.00	163.26		-150.00	162.25
	-200.00	124.77		-200.00	125.32		-200.00	127.00		-200.00	127.09
	-250.00	99.47		-250.00	98.24		-250.00	99.44		-250.00	98.89
	-300.00	79.15		-300.00	77.22		-300.00	77.00		-300.00	76.44
	-350.00	60.14		-350.00	58.81		-350.00	58.57		-350.00	55.29
	-400.00	41.17		-400.00	40.55		-400.00	40.37		-400.00	35.96
	-450.00	23.25		-450.00	22.99		-450.00	23.51		-450.00	18.22
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
40.00	500.00	**********	45.00	500.00	**********	50.00	500.00	**********	55.00	500.00	**********
	450.00	14.13		450.00	15.68		450.00	21.34		450.00	18.89
	400.00	28.42		400.00	29.80		400.00	32.42		400.00	30.84
	350.00	47.22		350.00	48.97		350.00	51.48		350.00	47.73
	300.00	66.41		300.00	67.58		300.00	69.92		300.00	67.19
	250.00	86.42		250.00	87.70		250.00	89.38		250.00	86.82
	200.00	113.59		200.00	113.30		200.00	114.26		200.00	113.22
	150.00	155.67		150.00	155.29		150.00	155.90		150.00	154.68
	100.00	198.80		100.00	198.40		100.00	198.54		100.00	197.27
	50.00	234.44		50.00	234.24		50.00	234.31		50.00	233.67
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	233.89		-50.00	233.73		-50.00	233.85		-50.00	233.26
	-100.00	197.69		-100.00	197.38		-100.00	197.61		-100.00	196.44
	-150.00	162.26		-150.00	162.87		-150.00	164.22		-150.00	163.33
	-200.00	128.28		-200.00	129.30		-200.00	131.33		-200.00	129.92
	-250.00	100.33		-250.00	101.94		-250.00	102.90		-250.00	99.63
	-300.00	76.99		-300.00	76.57		-300.00	77.69		-300.00	73.96
	-350.00	55.44		-350.00	55.05		-350.00	57.00		-350.00	52.77

	-400.00	33.42		-400.00	35.36		-400.00	38.40		-400.00	38.38
	-450.00	16.63		-450.00	18.05		-450.00	25.30		-450.00	23.46
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
60.00	500.00	**********	65.00	500.00	**********	70.00	500.00	**********	75.00	500.00	**********
	450.00	16.92		450.00	13.36		450.00	14.83		450.00	16.24
	400.00	27.56		400.00	24.53		400.00	25.83		400.00	27.16
	350.00	45.45		350.00	41.74		350.00	41.85		350.00	42.31
	300.00	65.09		300.00	62.18		300.00	61.33		300.00	62.18
	250.00	86.72		250.00	85.69		250.00	85.17		250.00	85.40
	200.00	113.44		200.00	113.54		200.00	114.86		200.00	116.51
	150.00	154.70		150.00	154.73		150.00	155.52		150.00	156.41
	100.00	196.55		100.00	195.56		100.00	195.14		100.00	194.84
	50.00	233.31		50.00	232.82		50.00	232.61		50.00	232.46
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	232.95		-50.00	232.51		-50.00	232.36		-50.00	232.27
	-100.00	195.82		-100.00	194.95		-100.00	194.64		-100.00	194.46
	-150.00	163.32		-150.00	162.61		-150.00	162.27		-150.00	161.61
	-200.00	129.57		-200.00	128.17		-200.00	127.82		-200.00	126.75
	-250.00	98.33		-250.00	96.37		-250.00	94.65		-250.00	93.63
	-300.00	71.39		-300.00	67.66		-300.00	66.48		-300.00	66.68
	-350.00	50.85		-350.00	47.26		-350.00	46.89		-350.00	45.95
	-400.00	34.70		-400.00	31.16		-400.00	29.66		-400.00	29.56
	-450.00	20.71		-450.00	15.21		-450.00	14.68		-450.00	13.38
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
80.00	500.00	**********	85.00	500.00	**********	90.00	500.00	**********	95.00	500.00	**********
	450.00	18.04		450.00	13.73		450.00	12.63		450.00	11.04
	400.00	28.39		400.00	27.63		400.00	27.15		400.00	27.61
	350.00	45.16		350.00	44.96		350.00	47.10		350.00	46.16
	300.00	64.49		300.00	65.69		300.00	68.53		300.00	67.73
	250.00	89.09		250.00	91.12		250.00	93.65		250.00	94.46
	200.00	119.42		200.00	121.05		200.00	123.80		200.00	124.77
	150.00	158.14		150.00	158.21		150.00	159.08		150.00	159.98
	100.00	195.11		100.00	194.66		100.00	194.79		100.00	194.54
	50.00	232.59		50.00	232.37		50.00	232.43		50.00	232.31
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	232.47		-50.00	232.31		-50.00	232.43		-50.00	232.37
	-100.00	194.86		-100.00	194.54		-100.00	194.79		-100.00	194.66
	-150.00	161.65		-150.00	159.98		-150.00	159.08		-150.00	158.21
	-200.00	126.80		-200.00	124.77		-200.00	123.80		-200.00	121.05
	-250.00	95.12		-250.00	94.46		-250.00	93.65		-250.00	91.12
	-300.00	68.37		-300.00	67.73		-300.00	68.53		-300.00	65.69
	-350.00	47.95		-350.00	46.16		-350.00	47.10		-350.00	44.96
	-400.00	28.12		-400.00	27.61		-400.00	27.15		-400.00	27.63
	-450.00	14.25		-450.00	11.04		-450.00	12.63		-450.00	13.73
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
100.00	500.00	**********	105.00	500.00	**********	110.00	500.00	**********	115.00	500.00	**********
	450.00	14.25		450.00	13.38		450.00	14.68		450.00	15.21
	400.00	28.12		400.00	29.56		400.00	29.66		400.00	31.16
	350.00	47.95		350.00	45.95		350.00	46.89		350.00	47.26
	300.00	68.37		300.00	66.68		300.00	66.48		300.00	67.66
	250.00	95.12		250.00	93.63		250.00	94.65		250.00	96.37
	200.00	126.80		200.00	126.75		200.00	127.82		200.00	128.17
	150.00	161.65		150.00	161.61		150.00	162.27		150.00	162.61
	100.00	194.86		100.00	194.46		100.00	194.64		100.00	194.95
	50.00	232.47		50.00	232.27		50.00	232.36		50.00	232.51
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	232.59		-50.00	232.46		-50.00	232.61		-50.00	232.82
	-100.00	195.11		-100.00	194.84		-100.00	195.14		-100.00	195.56
	-150.00	158.14		-150.00	156.41		-150.00	155.52		-150.00	154.73
	-200.00	119.42		-200.00	116.51		-200.00	114.86		-200.00	113.54

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ORIGINAL PAGE IS
OF POOR QUALITY

	-250.00	89.09		-250.00	85.40		-250.00	85.17		-250.00	85.69
	-300.00	64.49		-300.00	62.18		-300.00	61.33		-300.00	62.18
	-350.00	45.16		-350.00	42.31		-350.00	41.85		-350.00	41.74
	-400.00	28.39		-400.00	27.16		-400.00	25.83		-400.00	24.53
	-450.00	18.04		-450.00	16.24		-450.00	14.83		-450.00	13.36
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
120.00	500.00	**********	125.00	500.00	**********	130.00	500.00	**********	135.00	500.00	**********
	450.00	20.71		450.00	23.46		450.00	25.30		450.00	18.05
	400.00	34.70		400.00	38.38		400.00	38.40		400.00	35.36
	350.00	50.85		350.00	52.77		350.00	57.00		350.00	55.05
	300.00	71.38		300.00	73.96		300.00	77.69		300.00	76.57
	250.00	98.33		250.00	99.83		250.00	102.90		250.00	101.94
	200.00	129.57		200.00	129.92		200.00	131.33		200.00	129.30
	150.00	163.32		150.00	163.33		150.00	164.22		150.00	162.87
	100.00	195.82		100.00	196.44		100.00	197.61		100.00	197.38
	50.00	232.95		50.00	233.26		50.00	233.85		50.00	233.73
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	233.31		-50.00	233.67		-50.00	234.31		-50.00	234.24
	-100.00	196.55		-100.00	197.27		-100.00	198.54		-100.00	198.40
	-150.00	154.70		-150.00	154.68		-150.00	155.90		-150.00	155.29
	-200.00	113.44		-200.00	113.22		-200.00	114.26		-200.00	113.30
	-250.00	86.72		-250.00	86.82		-250.00	89.38		-250.00	87.70
	-300.00	65.09		-300.00	67.19		-300.00	69.92		-300.00	67.58
	-350.00	45.45		-350.00	47.73		-350.00	51.48		-350.00	48.97
	-400.00	27.56		-400.00	30.84		-400.00	32.42		-400.00	29.80
	-450.00	16.92		-450.00	16.89		-450.00	21.34		-450.00	15.68
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
140.00	500.00	**********	145.00	500.00	**********	150.00	500.00	**********	155.00	500.00	**********
	450.00	16.65		450.00	18.22		450.00	23.51		450.00	22.99
	400.00	33.42		400.00	35.95		400.00	40.37		400.00	40.55
	350.00	55.44		350.00	55.29		350.00	58.57		350.00	58.81
	300.00	76.99		300.00	76.44		300.00	77.00		300.00	77.22
	250.00	100.33		250.00	98.89		250.00	99.44		250.00	98.24
	200.00	128.28		200.00	127.09		200.00	127.00		200.00	125.32
	150.00	162.26		150.00	162.25		150.00	163.26		150.00	162.84
	100.00	197.69		100.00	198.28		100.00	199.41		100.00	199.68
	50.00	233.89		50.00	234.18		50.00	234.75		50.00	234.88
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	234.44		-50.00	234.77		-50.00	235.37		-50.00	235.53
	-100.00	196.80		-100.00	199.46		-100.00	200.66		-100.00	200.99
	-150.00	155.67		-150.00	156.99		-150.00	159.49		-150.00	160.61
	-200.00	113.59		-200.00	114.34		-200.00	116.41		-200.00	116.53
	-250.00	86.42		-250.00	85.45		-250.00	86.45		-250.00	85.88
	-300.00	66.41		-300.00	64.43		-300.00	63.79		-300.00	62.75
	-350.00	47.22		-350.00	45.13		-350.00	46.27		-350.00	44.19
	-400.00	28.42		-400.00	28.65		-400.00	30.82		-400.00	30.06
	-450.00	14.13		-450.00	15.41		-450.00	19.79		-450.00	17.68
	-500.00	**********		-500.00	**********		-500.00	**********		-500.00	**********
160.00	500.00	**********	165.00	500.00	**********	170.00	500.00	**********	175.00	500.00	**********
	450.00	23.25		450.00	20.89		450.00	21.52		450.00	18.95
	400.00	41.17		400.00	38.12		400.00	38.31		400.00	36.37
	350.00	60.14		350.00	58.08		350.00	59.32		350.00	57.75
	300.00	79.15		300.00	79.10		300.00	80.39		300.00	80.41
	250.00	99.47		250.00	99.11		250.00	100.51		250.00	100.01
	200.00	124.77		200.00	124.80		200.00	125.95		200.00	124.93
	150.00	163.07		150.00	162.43		150.00	162.78		150.00	162.62
	100.00	200.48		100.00	200.68		100.00	201.41		100.00	201.28
	50.00	235.28		50.00	235.38		50.00	235.74		50.00	235.68
	0.0	270.08		0.0	270.08		0.0	270.08		0.0	270.08
	-50.00	235.96		-50.00	236.08		-50.00	236.46		-50.00	236.40

-100.00	201.84	-100.00	202.08	-100.00	202.83	-100.00	202.72
-150.00	162.32	-150.00	162.66	-150.00	163.80	-150.00	164.01
-200.00	118.01	-200.00	119.31	-200.00	121.94	-200.00	121.22
-250.00	87.44	-250.00	87.43	-250.00	88.69	-250.00	88.31
-300.00	63.70	-300.00	63.14	-300.00	64.44	-300.00	64.53
-350.00	45.00	-350.00	42.71	-350.00	45.91	-350.00	45.67
-400.00	29.19	-400.00	28.18	-400.00	28.52	-400.00	28.93
-450.00	17.17	-450.00	13.70	-450.00	13.95	-450.00	10.08
-500.00**********		-500.00**********		-500.00**********		-500.00**********	

ORIGINAL PAGE IS
OF POOR QUALITY

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
1,0,2,18,15,30,36,14.,5.32E-5,2.27E-4,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,
 0.0,-0.7,-1.7,-2.7,-3.7,-5.0,
-5.0,-3.7,-2.7,-1.7,-0.7, 0.0,
 0.0,-0.3,-0.8,-1.5,-2.5,-4.0,
-2.8,-1.8,-1.2,-0.6,-0.2, 0.0,
 0.0,-0.4,-1.4,-2.4,-3.8,-5.6,
-4.0,-2.2,-1.1,-0.4,-0.1, 0.0,
 0.0,-0.4,-1.2,-2.1,-3.2,-5.1,
-4.2,-3.0,-2.0,-1.2,-0.5, 0.0,
 0.0,-0.5,-1.3,-2.3,-3.4,-4.4,
-3.8,-2.6,-1.8,-1.1,-0.5, 0.0,
 0.0,-0.5,-1.2,-2.2,-3.4,-4.8,
-4.0,-2.8,-1.8,-0.9,-0.4, 0.0,
 0.0,-0.4,-1.2,-2.0,-2.9,-4.4,
-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0,-0.3,-0.9,-2.0,-3.6,-6.0,
-4.6,-3.3,-2.3,-1.4,-0.6, 0.0,
 0.0,-0.1,-0.6,-1.4,-2.8,-4.5,
-4.5,-3.0,-2.8,-0.9,-0.3, 0.0,
 0.0,-0.4,-1.0,-1.9,-3.2,-4.8,
-4.3,-3.1,-2.2,-1.2,-0.4, 0.0,
 0.0,-0.1,-0.6,-1.4,-2.8,-4.5,
-4.5,-3.0,-2.8,-0.9,-0.3, 0.0,
 0.0,-0.3,-0.9,-2.0,-3.6,-6.0,
-4.6,-3.3,-2.3,-1.4,-0.6, 0.0,
 0.0,-0.4,-1.2,-2.0,-2.9,-4.4,
-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0,-0.5,-1.2,-2.2,-3.4,-4.8,
-4.0,-2.8,-1.8,-0.9,-0.4, 0.0,
 0.0,-0.5,-1.3,-2.3,-3.4,-4.4,
-3.8,-2.6,-1.8,-1.1,-0.5, 0.0,
 0.0,-0.4,-1.2,-2.1,-3.2,-5.1,
-4.2,-3.0,-2.0,-1.2,-0.5, 0.0,
 0.0,-0.4,-1.4,-2.4,-3.8,-5.6,
-4.0,-2.2,-1.1,-0.4,-0.1, 0.0,
 0.0,-0.3,-0.8,-1.5,-2.5,-4.0,
-2.8,-1.8,-1.2,-0.6,-0.2, 0.0,
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 7.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 15

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	-0.7	-1.7	-2.7	-3.7	-5.0***************	-5.0	-3.7	-2.7	-1.7	-0.7	0.0
2	0.0	-0.5	-1.2	-2.2	-3.2	-4.8***************	-3.9	-3.0	-2.2	-1.4	-0.5	0.0
3	0.0	-0.3	-0.8	-1.5	-2.5	-4.0***************	-2.8	-1.8	-1.2	-0.6	-0.2	0.0
4	0.0	-0.3	-1.0	-1.7	-2.9	-4.3***************	-3.0	-1.4	-0.7	-0.1	0.0	0.0
5	0.0	-0.4	-1.4	-2.4	-3.8	-5.6***************	-4.0	-2.2	-1.1	-0.4	-0.1	0.0
6	0.0	-0.5	-1.5	-2.5	-3.9	-6.1***************	-4.5	-3.0	-1.7	-0.9	-0.3	0.0
7	0.0	-0.4	-1.2	-2.1	-3.2	-5.1***************	-4.2	-3.0	-2.0	-1.2	-0.5	0.0
8	0.0	-0.4	-1.1	-1.9	-2.9	-4.1***************	-3.8	-2.7	-2.0	-1.2	-0.5	0.0
9	0.0	-0.5	-1.3	-2.3	-3.4	-4.4***************	-3.8	-2.6	-1.8	-1.1	-0.5	0.0
10	0.0	-0.6	-1.4	-2.5	-3.8	-5.1***************	-4.0	-2.7	-1.7	-1.0	-0.4	0.0
11	0.0	-0.5	-1.2	-2.2	-3.4	-4.8***************	-4.0	-2.8	-1.8	-0.9	-0.4	0.0
12	0.0	-0.4	-1.1	-1.9	-2.8	-4.1***************	-3.9	-2.8	-2.1	-1.1	-0.5	0.0
13	0.0	-0.4	-1.2	-2.0	-2.9	-4.4***************	-4.0	-3.0	-2.2	-1.4	-0.6	0.0
14	0.0	-0.4	-1.2	-2.2	-3.5	-5.5***************	-4.3	-3.3	-2.1	-1.6	-0.7	0.0
15	0.0	-0.3	-0.9	-2.0	-3.6	-6.0***************	-4.6	-3.3	-2.3	-1.4	-0.6	0.0
16	0.0	-0.1	-0.6	-1.5	-3.1	-5.3***************	-4.6	-3.1	-2.7	-1.0	-0.4	0.0
17	0.0	-0.1	-0.6	-1.4	-2.8	-4.5***************	-4.5	-3.0	-2.8	-0.9	-0.3	0.0
18	0.0	-0.3	-0.9	-1.7	-3.0	-4.6***************	-4.4	-3.0	-2.5	-1.1	-0.3	0.0
19	0.0	-0.4	-1.0	-1.9	-3.2	-4.8***************	-4.3	-3.1	-2.2	-1.2	-0.4	0.0
20	0.0	-0.3	-0.9	-1.7	-3.0	-4.6***************	-4.4	-3.0	-2.5	-1.1	-0.3	0.0
21	0.0	-0.1	-0.6	-1.4	-2.8	-4.5***************	-4.5	-3.0	-2.8	-0.9	-0.3	0.0
22	0.0	-0.1	-0.6	-1.5	-3.1	-5.3***************	-4.6	-3.1	-2.7	-1.0	-0.4	0.0
23	0.0	-0.3	-0.9	-2.0	-3.6	-6.0***************	-4.6	-3.3	-2.3	-1.4	-0.6	0.0
24	0.0	-0.4	-1.2	-2.2	-3.5	-5.5***************	-4.3	-3.3	-2.1	-1.6	-0.7	0.0
25	0.0	-0.4	-1.2	-2.0	-2.9	-4.4***************	-4.0	-3.0	-2.2	-1.4	-0.6	0.0
26	0.0	-0.4	-1.1	-1.9	-2.8	-4.1***************	-3.9	-2.8	-2.1	-1.1	-0.5	0.0
27	0.0	-0.5	-1.2	-2.2	-3.4	-4.8***************	-4.0	-2.8	-1.8	-0.9	-0.4	0.0
28	0.0	-0.6	-1.4	-2.5	-3.8	-5.1***************	-4.0	-2.7	-1.7	-1.0	-0.4	0.0
29	0.0	-0.5	-1.3	-2.3	-3.4	-4.4***************	-3.8	-2.6	-1.8	-1.1	-0.5	0.0
30	0.0	-0.4	-1.1	-1.9	-2.9	-4.1***************	-3.8	-2.7	-2.0	-1.2	-0.5	0.0
31	0.0	-0.4	-1.2	-2.1	-3.2	-5.1***************	-4.2	-3.0	-2.0	-1.2	-0.5	0.0
32	0.0	-0.5	-1.5	-2.5	-3.9	-6.1***************	-4.5	-3.0	-1.7	-0.9	-0.3	0.0
33	0.0	-0.4	-1.4	-2.4	-3.8	-5.6***************	-4.0	-2.2	-1.1	-0.4	-0.1	0.0
34	0.0	-0.3	-1.0	-1.7	-2.9	-4.3***************	-3.0	-1.4	-0.7	-0.1	0.0	0.0
35	0.0	-0.3	-0.8	-1.5	-2.5	-4.0***************	-2.8	-1.8	-1.2	-0.6	-0.2	0.0

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36      0.0 -0.5 -1.2 -2.2 -3.2 -4.8*************** -3.9 -3.0 -2.2 -1.4 -0.5  0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

     1                  0.2860E-01                 0.4785E+00
     2                  0.1519E-01                 0.4200E+00
     3                  0.1301E-01                 0.3965E+00
     4                  0.1237E-01                 0.3860E+00
     5                  0.1224E-01                 0.3808E+00
     6                  0.1229E-01                 0.3785E+00
     7                  0.1242E-01                 0.3778E+00
     8                  0.1256E-01                 0.3782E+00

RESULT IS FROM ITERATION:   8
MISSING PART OF THE PROJECTION DATA IN PERCENTS:       20.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.2294E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X: -700-652-603-555-507-459-410-362-314-266-217-169-121 -72 -24  24  72 121 169 217 266 314 362 410 459 507 555 603 652 700

 700 ******************************************************************************************
 652 ******************************************  -5  -6  -8 -15 -23 -18  -8  -7  -6   0*********************************************
 603 **********************************  -16 -22 -21 -11 -12 -24 -31 -28 -18 -10 -10 -11   0   0***********************************
 555 *************************  -1  -9 -24 -28 -23 -19 -22 -30 -38 -37 -28 -21 -18 -14  -5   0   0  -1*************************
 507 ******************** -15 -18 -23 -28 -27 -26 -28 -29 -33 -41 -46 -39 -32 -28 -21 -12  -7 -10 -13  -6********************
 459 **************** -19 -35 -35 -41 -39 -35 -33 -40 -43 -42 -46 -54 -55 -49 -43 -33 -23 -20 -26 -23 -18   0****************
 410 ************   0 -18 -30 -45 -56 -57 -46 -40 -43 -49 -52 -55 -65 -72 -59 -46 -35 -33 -38 -42 -33 -12   0   0************
 362 ************   0 -12 -23 -38 -64 -74 -69 -63 -61 -59 -57 -60 -72 -79 -72 -60 -52 -54 -58 -53 -27  -9   0   0************
 314 ********   0  -4 -13 -18 -28 -51 -74 -83 -82 -79 -76 -70 -75 -83 -90 -89 -75 -69 -71 -68 -45 -18  -6  -5  -6   0********
 266 ********  -6 -16 -22 -31 -32 -44 -59 -76 -91 -96 -93 -93 -97-103-109-109 -96 -85 -80 -68 -44 -25 -25 -21 -21 -12********
 217 ****  -1 -14 -17 -28 -44 -48 -52 -52 -67 -89 -96-105-122-147-157-155-148-127-111 -97 -81 -64 -51 -48 -37 -27 -22  -8****
 169 ****  -1  -4  -8 -19 -46 -58 -64 -57 -67 -85-110-147****************-225-178-142-124-103 -86 -64 -54 -35 -23 -14 -14****
 121 ****  -1  -3  -5 -12 -40 -63 -70 -72 -87-117-168************************-229-172-142-114 -84 -58 -42 -24 -19 -14 -15****
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ORIGINAL PAGE IS
OF POOR QUALITY

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  72 ****   -9 -18 -22 -27 -54 -82 -86 -90-114-162********************************-185-139-105 -78 -61 -45 -33 -29 -24 -18****
  24 **** -19 -33 -43 -52 -77-104-102-105-131-193********************************-198-130 -94 -76 -70 -64 -56 -46 -34 -22****
 -24 **** -19 -33 -43 -52 -77-104-102-105-131-193********************************-198-130 -94 -76 -70 -64 -56 -46 -34 -22****
 -72 ****   -9 -18 -22 -27 -54 -82 -86 -90-114-162********************************-185-139-105 -78 -61 -45 -33 -29 -24 -18****
-121 ****   -1  -3  -5 -12 -40 -63 -70 -72 -87-117-168************************-229-172-142-114 -84 -58 -42 -24 -19 -14 -15****
-169 ****   -1  -4  -8 -19 -46 -58 -64 -57 -67 -85-110-147****************-225-178-142-124-103 -86 -64 -54 -35 -23 -14 -14****
-217 ****   -1 -14 -17 -28 -44 -48 -52 -52 -67 -89 -96-105-122-147-157-155-148-127-111 -97 -81 -64 -51 -48 -37 -27 -22  -8****
-266 ********  -6 -16 -22 -31 -32 -44 -59 -76 -91 -96 -93 -93 -97-103-109-109 -96 -85 -80 -68 -44 -25 -25 -21 -21 -12********
-314 ********   0  -4 -13 -18 -28 -51 -74 -83 -82 -79 -76 -70 -75 -83 -90 -89 -75 -69 -71 -68 -45 -18  -6  -5  -6   0********
-362 ************   0 -12 -23 -38 -64 -74 -69 -63 -61 -59 -57 -60 -72 -79 -72 -60 -52 -54 -58 -53 -27  -9   0   0************
-410 ************   0 -18 -30 -45 -56 -57 -46 -40 -43 -49 -52 -55 -65 -72 -59 -46 -35 -33 -38 -42 -33 -12   0   0************
-459 **************** -19 -35 -35 -41 -39 -35 -33 -40 -43 -42 -46 -54 -55 -49 -43 -33 -23 -20 -26 -23 -18   0****************
-507 ******************** -15 -18 -23 -28 -27 -26 -28 -29 -33 -41 -46 -39 -32 -28 -21 -12  -7 -10 -13  -6********************
-555 ************************  -1  -9 -24 -28 -23 -19 -22 -30 -38 -37 -28 -21 -18 -14  -5   0   0  -1************************
-603 ******************************** -16 -22 -21 -11 -12 -24 -31 -28 -18 -10 -10 -11   0   0********************************
-652 ****************************************  -5  -6  -8 -15 -23 -18  -8  -7  -6   0****************************************
-700 ************************************************************************************************************************
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```
 NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
-1,0,2,18,15,29,36,14.,5.32E-5,2.27E-4,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,
 0.0,-0.7,-1.7,-2.7,-3.7,-5.0,
-5.0,-3.7,-2.7,-1.7,-0.7, 0.0,
 0.0,-0.3,-0.8,-1.5,-2.5,-4.0,
-2.8,-1.8,-1.2,-0.6,-0.2, 0.0,
 0.0,-0.4,-1.4,-2.4,-3.8,-5.6,
-4.0,-2.2,-1.1,-0.4,-0.1, 0.0,
 0.0,-0.4,-1.2,-2.1,-3.2,-5.1,
-4.2,-3.0,-2.0,-1.2,-0.5, 0.0,
 0.0,-0.5,-1.3,-2.3,-3.4,-4.4,
-3.8,-2.6,-1.8,-1.1,-0.5, 0.0,
 0.0,-0.5,-1.2,-2.2,-3.4,-4.8,
-4.0,-2.8,-1.8,-0.9,-0.4, 0.0,
 0.0,-0.4,-1.2,-2.0,-2.9,-4.4,
-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0,-0.3,-0.9,-2.0,-3.6,-6.0,
-4.6,-3.3,-2.3,-1.4,-0.6, 0.0,
 0.0,-0.1,-0.6,-1.4,-2.8,-4.5,
-4.5,-3.0,-2.8,-0.9,-0.3, 0.0,
 0.0,-0.4,-1.0,-1.9,-3.2,-4.8,
-4.3,-3.1,-2.2,-1.2,-0.4, 0.0,
 0.0,-0.1,-0.6,-1.4,-2.8,-4.5,
-4.5,-3.0,-2.8,-0.9,-0.3, 0.0,
 0.0,-0.3,-0.9,-2.0,-3.6,-6.0,
-4.6,-3.3,-2.3,-1.4,-0.6, 0.0,
 0.0,-0.4,-1.2,-2.0,-2.9,-4.4,
-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0,-0.5,-1.2,-2.2,-3.4,-4.8,
-4.0,-2.8,-1.8,-0.9,-0.4, 0.0,
 0.0,-0.5,-1.3,-2.3,-3.4,-4.4,
-3.8,-2.6,-1.8,-1.1,-0.5, 0.0,
 0.0,-0.4,-1.2,-2.1,-3.2,-5.1,
-4.2,-3.0,-2.0,-1.2,-0.5, 0.0,
 0.0,-0.4,-1.4,-2.4,-3.8,-5.6,
-4.0,-2.2,-1.1,-0.4,-0.1, 0.0,
 0.0,-0.3,-0.8,-1.5,-2.5,-4.0,
-2.8,-1.8,-1.2,-0.6,-0.2, 0.0,

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A82

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 7.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 15

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

1	0.0	-0.7	-1.7	-2.7	-3.7	-5.0***************	-5.0	-3.7	-2.7	-1.7	-0.7	0.0
2	0.0	-0.5	-1.2	-2.2	-3.2	-4.8***************	-3.9	-3.0	-2.2	-1.4	-0.5	0.0
3	0.0	-0.3	-0.8	-1.5	-2.5	-4.0***************	-2.8	-1.8	-1.2	-0.6	-0.2	0.0
4	0.0	-0.3	-1.0	-1.7	-2.9	-4.3***************	-3.0	-1.4	-0.7	-0.1	0.0	0.0
5	0.0	-0.4	-1.4	-2.4	-3.8	-5.6***************	-4.0	-2.2	-1.1	-0.4	-0.1	0.0
6	0.0	-0.5	-1.5	-2.5	-3.9	-6.1***************	-4.5	-3.0	-1.7	-0.9	-0.3	0.0
7	0.0	-0.4	-1.2	-2.1	-3.2	-5.1***************	-4.2	-3.0	-2.0	-1.2	-0.5	0.0
8	0.0	-0.4	-1.1	-1.9	-2.9	-4.1***************	-3.8	-2.7	-2.0	-1.2	-0.5	0.0
9	0.0	-0.5	-1.3	-2.3	-3.4	-4.4***************	-3.8	-2.6	-1.8	-1.1	-0.5	0.0
10	0.0	-0.6	-1.4	-2.5	-3.8	-5.1***************	-4.0	-2.7	-1.7	-1.0	-0.4	0.0
11	0.0	-0.5	-1.2	-2.2	-3.4	-4.8***************	-4.0	-2.8	-1.8	-0.9	-0.4	0.0
12	0.0	-0.4	-1.1	-1.9	-2.8	-4.1***************	-3.9	-2.8	-2.1	-1.1	-0.5	0.0
13	0.0	-0.4	-1.2	-2.0	-2.9	-4.4***************	-4.0	-3.0	-2.2	-1.4	-0.6	0.0
14	0.0	-0.4	-1.2	-2.2	-3.5	-5.5***************	-4.3	-3.3	-2.1	-1.6	-0.7	0.0
15	0.0	-0.3	-0.9	-2.0	-3.6	-6.0***************	-4.6	-3.3	-2.3	-1.4	-0.6	0.0
16	0.0	-0.1	-0.6	-1.5	-3.1	-5.3***************	-4.6	-3.1	-2.7	-1.0	-0.4	0.0
17	0.0	-0.1	-0.6	-1.4	-2.8	-4.5***************	-4.5	-3.0	-2.8	-0.9	-0.3	0.0
18	0.0	-0.3	-0.9	-1.7	-3.0	-4.6***************	-4.4	-3.0	-2.5	-1.1	-0.3	0.0
19	0.0	-0.4	-1.0	-1.9	-3.2	-4.8***************	-4.3	-3.1	-2.2	-1.2	-0.4	0.0
20	0.0	-0.3	-0.9	-1.7	-3.0	-4.6***************	-4.4	-3.0	-2.5	-1.1	-0.3	0.0
21	0.0	-0.1	-0.6	-1.4	-2.8	-4.5***************	-4.5	-3.0	-2.8	-0.9	-0.3	0.0
22	0.0	-0.1	-0.6	-1.5	-3.1	-5.3***************	-4.6	-3.1	-2.7	-1.0	-0.4	0.0
23	0.0	-0.3	-0.9	-2.0	-3.6	-6.0***************	-4.6	-3.3	-2.3	-1.4	-0.6	0.0
24	0.0	-0.4	-1.2	-2.2	-3.5	-5.5***************	-4.3	-3.3	-2.1	-1.6	-0.7	0.0
25	0.0	-0.4	-1.2	-2.0	-2.9	-4.4***************	-4.0	-3.0	-2.2	-1.4	-0.6	0.0
26	0.0	-0.4	-1.1	-1.9	-2.8	-4.1***************	-3.9	-2.8	-2.1	-1.1	-0.5	0.0
27	0.0	-0.5	-1.2	-2.2	-3.4	-4.8***************	-4.0	-2.8	-1.8	-0.9	-0.4	0.0
28	0.0	-0.6	-1.4	-2.5	-3.8	-5.1***************	-4.0	-2.7	-1.7	-1.0	-0.4	0.0
29	0.0	-0.5	-1.3	-2.3	-3.4	-4.4***************	-3.8	-2.6	-1.8	-1.1	-0.5	0.0
30	0.0	-0.4	-1.1	-1.9	-2.9	-4.1***************	-3.8	-2.7	-2.0	-1.2	-0.5	0.0
31	0.0	-0.4	-1.2	-2.1	-3.2	-5.1***************	-4.2	-3.0	-2.0	-1.2	-0.5	0.0
32	0.0	-0.5	-1.5	-2.5	-3.9	-6.1***************	-4.5	-3.0	-1.7	-0.9	-0.3	0.0
33	0.0	-0.4	-1.4	-2.4	-3.8	-5.6***************	-4.0	-2.2	-1.1	-0.4	-0.1	0.0
34	0.0	-0.3	-1.0	-1.7	-2.9	-4.3***************	-3.0	-1.4	-0.7	-0.1	0.0	0.0
35	0.0	-0.3	-0.8	-1.5	-2.5	-4.0***************	-2.8	-1.8	-1.2	-0.6	-0.2	0.0

36 0.0 -0.5 -1.2 -2.2 -3.2 -4.8*************** -3.9 -3.0 -2.2 -1.4 -0.5 0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1	0.2860E-01	0.4785E+00
2	0.1519E-01	0.4200E+00
3	0.1301E-01	0.3965E+00
4	0.1237E-01	0.3860E+00
5	0.1224E-01	0.3808E+00
6	0.1229E-01	0.3785E+00
7	0.1242E-01	0.3778E+00
8	0.1256E-01	0.3782E+00

RESULT IS FROM ITERATION: 8
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 20.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2500E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	700.00	**********	5.00	700.00	**********	10.00	700.00	**********	15.00	700.00	**********
	650.00	-31.59		650.00	-26.10		650.00	-17.42		650.00	-16.86
	600.00	-41.79		600.00	-32.16		600.00	-17.60		600.00	-18.38
	550.00	-53.85		550.00	-41.91		550.00	-23.99		550.00	-25.44
	500.00	-67.57		500.00	-54.96		500.00	-35.82		500.00	-36.92
	450.00	-76.16		450.00	-65.96		450.00	-50.43		450.00	-51.56
	400.00	-75.34		400.00	-70.79		400.00	-64.97		400.00	-69.18
	350.00	-80.81		350.00	-82.48		350.00	-88.06		350.00	-97.44
	300.00	-101.16		300.00	-104.20		300.00	-112.61		300.00	-123.84
	250.00	-145.94		250.00	-148.82		250.00	-155.25		250.00	-161.43
	200.00	-240.71		200.00	-239.70		200.00	-238.59		200.00	-240.05
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-239.12		-200.00	-236.85		-200.00	-232.04		-200.00	-227.19
	-250.00	-148.40		-250.00	-147.87		-250.00	-145.54		-250.00	-140.26
	-300.00	-110.61		-300.00	-109.05		-300.00	-104.70		-300.00	-98.37
	-350.00	-107.60		-350.00	-103.54		-350.00	-93.59		-350.00	-82.30
	-400.00	-111.50		-400.00	-103.61		-400.00	-87.29		-400.00	-75.05
	-450.00	-92.06		-450.00	-82.06		-450.00	-63.95		-450.00	-56.92
	-500.00	-65.66		-500.00	-52.63		-500.00	-30.64		-500.00	-26.82
	-550.00	-52.92		-550.00	-38.08		-550.00	-13.21		-550.00	-8.82
	-600.00	-42.38		-600.00	-28.99		-600.00	-7.47		-600.00	-4.96
	-650.00	-30.67		-650.00	-20.25		-650.00	-4.91		-650.00	-5.74

A90

ORIGINAL PAGE IS
OF POOR QUALITY

	-700.00	**********
20.00	700.00	**********
	650.00	-21.66
	600.00	-28.82
	550.00	-39.27
	500.00	-51.82
	450.00	-65.01
	400.00	-80.50
	350.00	-107.11
	300.00	-133.70
	250.00	-166.14
	200.00	-243.08
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-221.05
	-250.00	-132.38
	-300.00	-90.83
	-350.00	-72.74
	-400.00	-69.54
	-450.00	-61.75
	-500.00	-41.00
	-550.00	-24.10
	-600.00	-17.49
	-650.00	-15.07
	-700.00	**********
40.00	700.00	**********
	650.00	-4.49
	600.00	-12.18
	550.00	-23.42
	500.00	-37.93
	450.00	-54.73
	400.00	-71.18
	350.00	-93.30
	300.00	-123.69
	250.00	-167.44
	200.00	-248.22
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-180.62
	-250.00	-104.25
	-300.00	-81.50
	-350.00	-67.74
	-400.00	-59.51
	-450.00	-56.42
	-500.00	-45.42
	-550.00	-33.80
	-600.00	-29.13
	-650.00	-25.89
	-700.00	**********
60.00	700.00	**********

	-700.00	**********
25.00	700.00	**********
	650.00	-19.03
	600.00	-26.88
	550.00	-38.42
	500.00	-52.80
	450.00	-68.39
	400.00	-85.62
	350.00	-111.83
	300.00	-138.45
	250.00	-170.08
	200.00	-244.65
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-210.98
	-250.00	-123.71
	-300.00	-83.18
	-350.00	-65.34
	-400.00	-63.87
	-450.00	-62.81
	-500.00	-49.19
	-550.00	-32.99
	-600.00	-21.64
	-650.00	-13.15
	-700.00	**********
45.00	700.00	**********
	650.00	-17.83
	600.00	-29.28
	550.00	-42.22
	500.00	-55.37
	450.00	-66.62
	400.00	-73.99
	350.00	-87.50
	300.00	-116.44
	250.00	-163.64
	200.00	-250.02
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-174.75
	-250.00	-102.92
	-300.00	-89.23
	-350.00	-80.12
	-400.00	-74.90
	-450.00	-74.08
	-500.00	-66.66
	-550.00	-53.65
	-600.00	-42.78
	-650.00	-35.24
	-700.00	**********
65.00	700.00	**********

	-700.00	**********
30.00	700.00	**********
	650.00	-6.52
	600.00	-10.01
	550.00	-19.74
	500.00	-35.51
	450.00	-56.35
	400.00	-79.79
	350.00	-109.12
	300.00	-137.06
	250.00	-172.48
	200.00	-244.46
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-198.36
	-250.00	-115.71
	-300.00	-77.71
	-350.00	-60.43
	-400.00	-55.19
	-450.00	-53.52
	-500.00	-40.74
	-550.00	-25.38
	-600.00	-13.92
	-650.00	-3.96
	-700.00	**********
50.00	700.00	**********
	650.00	-20.09
	600.00	-29.21
	550.00	-41.55
	500.00	-54.90
	450.00	-66.13
	400.00	-72.32
	350.00	-83.83
	300.00	-110.93
	250.00	-161.01
	200.00	-247.79
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-168.55
	-250.00	-104.51
	-300.00	-96.10
	-350.00	-90.65
	-400.00	-83.90
	-450.00	-80.46
	-500.00	-72.54
	-550.00	-57.49
	-600.00	-40.23
	-650.00	-26.85
	-700.00	**********
70.00	700.00	**********

	-700.00	**********
35.00	700.00	**********
	650.00	0.0
	600.00	-0.52
	550.00	-9.65
	500.00	-25.47
	450.00	-47.51
	400.00	-72.08
	350.00	-101.39
	300.00	-131.27
	250.00	-171.41
	200.00	-245.33
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-187.67
	-250.00	-108.93
	-300.00	-76.91
	-350.00	-60.46
	-400.00	-51.26
	-450.00	-47.02
	-500.00	-33.45
	-550.00	-20.24
	-600.00	-13.78
	-650.00	-8.01
	-700.00	**********
55.00	700.00	**********
	650.00	-9.19
	600.00	-14.39
	550.00	-25.73
	500.00	-40.49
	450.00	-54.64
	400.00	-65.26
	350.00	-81.48
	300.00	-107.95
	250.00	-157.09
	200.00	-242.64
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-164.47
	-250.00	-106.49
	-300.00	-99.20
	-350.00	-93.25
	-400.00	-79.92
	-450.00	-69.60
	-500.00	-57.79
	-550.00	-44.55
	-600.00	-30.64
	-650.00	-18.41
	-700.00	**********
75.00	700.00	**********

	650.00	-0.73
	600.00	-5.63
	550.00	-17.11
	500.00	-32.27
	450.00	-46.44
	400.00	-59.30
	350.00	-80.64
	300.00	-106.97
	250.00	-149.85
	200.00	-237.36
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-164.99
	-250.00	-106.64
	-300.00	-98.14
	-350.00	-87.99
	-400.00	-69.23
	-450.00	-54.73
	-500.00	-40.83
	-550.00	-32.27
	-600.00	-28.06
	-650.00	-23.24
	-700.00	**********
80.00	700.00	**********
	650.00	-10.61
	600.00	-16.10
	550.00	-29.23
	500.00	-46.14
	450.00	-62.13
	400.00	-74.36
	350.00	-85.35
	300.00	-94.09
	250.00	-121.83
	200.00	-204.16
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-179.05
	-250.00	-110.12
	-300.00	-80.44
	-350.00	-63.78
	-400.00	-53.02
	-450.00	-47.52
	-500.00	-38.46
	-550.00	-28.24
	-600.00	-19.23
	-650.00	-13.01
	-700.00	**********
100.00	700.00	**********
	650.00	-13.01
	600.00	-19.23

	650.00	-3.88
	600.00	-10.38
	550.00	-21.93
	500.00	-36.03
	450.00	-47.88
	400.00	-59.60
	350.00	-82.10
	300.00	-105.98
	250.00	-140.94
	200.00	-231.81
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-168.34
	-250.00	-105.66
	-300.00	-94.02
	-350.00	-79.62
	-400.00	-61.15
	-450.00	-48.56
	-500.00	-36.09
	-550.00	-29.24
	-600.00	-28.93
	-650.00	-29.11
	-700.00	**********
85.00	700.00	**********
	650.00	-18.65
	600.00	-25.78
	550.00	-37.48
	500.00	-51.45
	450.00	-63.25
	400.00	-70.83
	350.00	-78.56
	300.00	-89.06
	250.00	-115.77
	200.00	-198.33
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-186.55
	-250.00	-110.65
	-300.00	-80.98
	-350.00	-64.51
	-400.00	-55.15
	-450.00	-51.29
	-500.00	-44.40
	-550.00	-37.10
	-600.00	-31.11
	-650.00	-24.71
	-700.00	**********
105.00	700.00	**********
	650.00	-10.76
	600.00	-15.68

	650.00	-10.25
	600.00	-16.35
	550.00	-27.51
	500.00	-41.39
	450.00	-53.54
	400.00	-65.18
	350.00	-85.22
	300.00	-103.36
	250.00	-133.44
	200.00	-223.65
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-171.26
	-250.00	-105.98
	-300.00	-88.44
	-350.00	-72.24
	-400.00	-57.61
	-450.00	-49.06
	-500.00	-38.37
	-550.00	-28.54
	-600.00	-23.14
	-650.00	-21.80
	-700.00	**********
90.00	700.00	**********
	650.00	-27.87
	600.00	-35.04
	550.00	-42.61
	500.00	-51.52
	450.00	-58.80
	400.00	-62.58
	350.00	-70.12
	300.00	-84.39
	250.00	-111.78
	200.00	-193.39
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-193.39
	-250.00	-111.78
	-300.00	-84.39
	-350.00	-70.12
	-400.00	-62.58
	-450.00	-58.80
	-500.00	-51.52
	-550.00	-42.61
	-600.00	-35.04
	-650.00	-27.87
	-700.00	**********
110.00	700.00	**********
	650.00	-21.80
	600.00	-23.14

	650.00	-10.68
	600.00	-15.46
	550.00	-27.31
	500.00	-43.07
	450.00	-58.38
	400.00	-71.63
	350.00	-87.33
	300.00	-99.10
	250.00	-127.71
	200.00	-213.22
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-173.96
	-250.00	-108.18
	-300.00	-83.29
	-350.00	-66.89
	-400.00	-55.06
	-450.00	-48.57
	-500.00	-38.35
	-550.00	-26.09
	-600.00	-15.68
	-650.00	-10.76
	-700.00	**********
95.00	700.00	**********
	650.00	-24.71
	600.00	-31.11
	550.00	-37.10
	500.00	-44.40
	450.00	-51.29
	400.00	-55.15
	350.00	-64.51
	300.00	-80.98
	250.00	-110.65
	200.00	-186.55
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	-198.33
	-250.00	-115.77
	-300.00	-89.06
	-350.00	-78.56
	-400.00	-70.83
	-450.00	-63.25
	-500.00	-51.45
	-550.00	-37.48
	-600.00	-25.78
	-650.00	-18.65
	-700.00	**********
115.00	700.00	**********
	650.00	-29.11
	600.00	-28.93

A92

ORIGINAL PAGE IS
OF POOR QUALITY

	550.00	-28.24		550.00	-26.09		550.00	-28.54		550.00	-29.24
	500.00	-38.46		500.00	-38.35		500.00	-38.37		500.00	-36.09
	450.00	-47.52		450.00	-48.57		450.00	-49.06		450.00	-48.56
	400.00	-53.02		400.00	-55.06		400.00	-57.61		400.00	-61.15
	350.00	-63.78		350.00	-66.89		350.00	-72.24		350.00	-79.62
	300.00	-80.44		300.00	-83.29		300.00	-88.44		300.00	-94.02
	250.00	-110.12		250.00	-108.18		250.00	-105.98		250.00	-105.66
	200.00	-179.05		200.00	-173.96		200.00	-171.26		200.00	-168.34
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-204.16		-200.00	-213.22		-200.00	-223.65		-200.00	-231.81
	-250.00	-121.83		-250.00	-127.71		-250.00	-133.44		-250.00	-140.94
	-300.00	-94.09		-300.00	-99.10		-300.00	-103.36		-300.00	-105.98
	-350.00	-85.35		-350.00	-87.33		-350.00	-85.22		-350.00	-82.10
	-400.00	-74.36		-400.00	-71.63		-400.00	-65.18		-400.00	-59.60
	-450.00	-62.13		-450.00	-58.38		-450.00	-53.54		-450.00	-47.88
	-500.00	-46.14		-500.00	-43.07		-500.00	-41.39		-500.00	-36.03
	-550.00	-29.23		-550.00	-27.31		-550.00	-27.51		-550.00	-21.93
	-600.00	-16.10		-600.00	-15.46		-600.00	-16.35		-600.00	-10.38
	-650.00	-10.61		-650.00	-10.68		-650.00	-10.25		-650.00	-3.88
	-700.00	**********		-700.00	**********		-700.00	**********		-700.00	**********
120.00	700.00	**********	125.00	700.00	**********	130.00	700.00	**********	135.00	700.00	**********
	650.00	-23.24		650.00	-18.41		650.00	-26.85		650.00	-35.24
	600.00	-28.06		600.00	-30.64		600.00	-40.23		600.00	-42.78
	550.00	-32.27		550.00	-44.55		550.00	-57.49		550.00	-53.65
	500.00	-40.83		500.00	-57.79		500.00	-72.54		500.00	-66.66
	450.00	-54.73		450.00	-69.60		450.00	-80.46		450.00	-74.08
	400.00	-69.23		400.00	-79.92		400.00	-83.90		400.00	-74.90
	350.00	-87.99		350.00	-93.25		350.00	-90.65		350.00	-80.12
	300.00	-98.14		300.00	-99.20		300.00	-96.10		300.00	-89.23
	250.00	-106.64		250.00	-106.49		250.00	-104.51		250.00	-102.92
	200.00	-164.99		200.00	-164.47		200.00	-168.55		200.00	-174.75
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-237.36		-200.00	-242.64		-200.00	-247.79		-200.00	-250.02
	-250.00	-149.85		-250.00	-157.09		-250.00	-161.01		-250.00	-163.64
	-300.00	-106.97		-300.00	-107.95		-300.00	-110.93		-300.00	-116.44
	-350.00	-80.64		-350.00	-81.48		-350.00	-83.83		-350.00	-87.50
	-400.00	-59.30		-400.00	-65.26		-400.00	-72.32		-400.00	-73.99
	-450.00	-46.44		-450.00	-54.64		-450.00	-66.13		-450.00	-66.62
	-500.00	-32.27		-500.00	-40.49		-500.00	-54.90		-500.00	-55.37
	-550.00	-17.11		-550.00	-25.73		-550.00	-41.55		-550.00	-42.22
	-600.00	-5.63		-600.00	-14.39		-600.00	-29.21		-600.00	-29.28
	-650.00	-0.73		-650.00	-9.19		-650.00	-20.09		-650.00	-17.83
	-700.00	**********		-700.00	**********		-700.00	**********		-700.00	**********
140.00	700.00	**********	145.00	700.00	**********	150.00	700.00	**********	155.00	700.00	**********
	650.00	-25.89		650.00	-8.01		650.00	-3.96		650.00	-13.15
	600.00	-29.13		600.00	-13.78		600.00	-13.92		600.00	-21.64
	550.00	-33.80		550.00	-20.24		550.00	-25.38		550.00	-32.99
	500.00	-45.42		500.00	-33.45		500.00	-40.74		500.00	-49.19

ORIGINAL PAGE IS
OF POOR QUALITY

	450.00	-56.42		450.00	-47.02		450.00	-53.52		450.00	-62.81
	400.00	-59.51		400.00	-51.26		400.00	-55.19		400.00	-63.87
	350.00	-67.74		350.00	-60.46		350.00	-60.43		350.00	-65.34
	300.00	-81.50		300.00	-76.91		300.00	-77.71		300.00	-83.18
	250.00	-104.25		250.00	-108.93		250.00	-115.71		250.00	-123.71
	200.00	-180.62		200.00	-187.67		200.00	-198.36		200.00	-210.98
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-248.22		-200.00	-245.33		-200.00	-244.46		-200.00	-244.65
	-250.00	-167.44		-250.00	-171.41		-250.00	-172.48		-250.00	-170.08
	-300.00	-123.69		-300.00	-131.27		-300.00	-137.06		-300.00	-138.45
	-350.00	-93.30		-350.00	-101.39		-350.00	-109.12		-350.00	-111.83
	-400.00	-71.18		-400.00	-72.08		-400.00	-79.79		-400.00	-85.62
	-450.00	-54.73		-450.00	-47.51		-450.00	-56.35		-450.00	-68.39
	-500.00	-37.93		-500.00	-25.47		-500.00	-35.51		-500.00	-52.80
	-550.00	-23.42		-550.00	-9.65		-550.00	-19.74		-550.00	-38.42
	-600.00	-12.18		-600.00	-0.52		-600.00	-10.01		-600.00	-26.88
	-650.00	-4.49		-650.00	0.0		-650.00	-6.52		-650.00	-19.03
	-700.00	**********		-700.00	**********		-700.00	**********		-700.00	**********
160.00	700.00	**********	165.00	700.00	**********	170.00	700.00	**********	175.00	700.00	**********
	650.00	-15.07		650.00	-5.74		650.00	-4.91		650.00	-20.25
	600.00	-17.49		600.00	-4.96		600.00	-7.47		600.00	-28.99
	550.00	-24.10		550.00	-8.82		550.00	-13.21		550.00	-38.08
	500.00	-41.00		500.00	-26.82		500.00	-30.64		500.00	-52.63
	450.00	-61.75		450.00	-56.92		450.00	-63.95		450.00	-82.06
	400.00	-69.54		400.00	-75.05		400.00	-87.29		400.00	-103.61
	350.00	-72.74		350.00	-82.30		350.00	-93.59		350.00	-103.54
	300.00	-90.83		300.00	-98.37		300.00	-104.70		300.00	-109.05
	250.00	-132.38		250.00	-140.26		250.00	-145.54		250.00	-147.87
	200.00	-221.05		200.00	-227.19		200.00	-232.04		200.00	-236.85
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
	100.00	**********		100.00	**********		100.00	**********		100.00	**********
	50.00	**********		50.00	**********		50.00	**********		50.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-50.00	**********		-50.00	**********		-50.00	**********		-50.00	**********
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
	-150.00	**********		-150.00	**********		-150.00	**********		-150.00	**********
	-200.00	-243.08		-200.00	-240.05		-200.00	-238.59		-200.00	-239.70
	-250.00	-166.14		-250.00	-161.43		-250.00	-155.25		-250.00	-148.82
	-300.00	-133.70		-300.00	-123.84		-300.00	-112.61		-300.00	-104.20
	-350.00	-107.11		-350.00	-97.44		-350.00	-88.06		-350.00	-82.48
	-400.00	-80.50		-400.00	-69.18		-400.00	-64.97		-400.00	-70.79
	-450.00	-65.01		-450.00	-51.56		-450.00	-50.43		-450.00	-65.96
	-500.00	-51.82		-500.00	-36.92		-500.00	-35.82		-500.00	-54.96
	-550.00	-39.27		-550.00	-25.44		-550.00	-23.99		-550.00	-41.91
	-600.00	-28.82		-600.00	-18.38		-600.00	-17.60		-600.00	-32.16
	-650.00	-21.66		-650.00	-16.86		-650.00	-17.42		-650.00	-26.10
	-700.00	**********		-700.00	**********		-700.00	**********		-700.00	**********

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
1,0,2,18,21,30,36,20.,5.32E-5,2.27E-4,
9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,
 0.0,-0.6,-1.4,-2.2,-3.0,-4.0,-5.3,-7.1,-13.0,
-13.0,-7.1,-5.3,-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4.9, -9.0,
-12.0,-6.2,-4.1,-2.6,-1.7,-1.2,-0.7,-0.3, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.2,-0.5,-1.2,-3.0,-10.0,
-16.0,-5.8,-4.0,-2.4,-1.3,-0.6,-0.2, 0.0, 0.0,
 0.0,-0.1,-0.3,-0.6,-1.3,-2.3,-3.8,-6.0,-14.0,
-14.0,-6.4,-4.0,-2.3,-1.4,-0.8,-0.4,-0.2, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.3,-0.9,-1.5,-4.8,-14.0,
-11.0,-6.5,-4.6,-3.3,-2.4,-1.6,-0.9,-0.4, 0.0,
 0.0,-0.6,-1.6,-2.6,-3.7,-4.9,-6.2,-7.8,-13.0,
-13.0,-6.5,-4.0,-2.3,-1.2,-0.5,-0.2, 0.0, 0.0,
 0.0,-0.2,-0.4,-0.9,-1.6,-2.6,-4.0,-5.9,-11.0,
-11.0,-6.9,-5.0,-3.6,-2.6,-1.7,-1.0,-0.4, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.5,-2.6,-4.0,-6.0,-14.0,
-13.0,-7.5,-5.0,-3.2,-2.2,-1.5,-0.9,-0.4, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.1,-0.6,-1.4,-3.4,-10.6,
-11.0,-5.5,-3.3,-2.0,-1.0,-0.5,-0.3,-0.1, 0.0,
 0.0,-0.4,-0.9,-1.6,-2.4,-3.4,-4.7,-6.5,-13.0,
-12.0,-5.6,-3.6,-2.4,-1.6,-1.0,-0.6,-0.3, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.1,-0.6,-1.4,-3.4,-10.6,
-11.0,-5.5,-3.3,-2.0,-1.0,-0.5,-0.3,-0.1, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.5,-2.6,-4.0,-6.0,-14.0,
-13.0,-7.5,-5.0,-3.2,-2.2,-1.5,-0.9,-0.4, 0.0,
 0.0,-0.2,-0.4,-0.9,-1.6,-2.6,-4.0,-5.9,-11.0,
-11.0,-6.9,-5.0,-3.6,-2.6,-1.7,-1.0,-0.4, 0.0,
 0.0,-0.6,-1.6,-2.6,-3.7,-4.9,-6.2,-7.8,-13.0,
-13.0,-6.5,-4.0,-2.3,-1.2,-0.5,-0.2, 0.0, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.3,-0.9,-1.5,-4.8,-14.0,
-11.0,-6.5,-4.6,-3.3,-2.4,-1.6,-0.9,-0.4, 0.0,
 0.0,-0.1,-0.3,-0.6,-1.3,-2.3,-3.8,-6.0,-14.0,
-14.0,-6.4,-4.0,-2.3,-1.4,-0.8,-0.4,-0.2, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.2,-0.5,-1.2,-3.0,-10.0,
-16.0,-5.8,-4.0,-2.4,-1.3,-0.6,-0.2, 0.0, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4.9, -9.0,
-12.0,-6.2,-4.1,-2.6,-1.7,-1.2,-0.7,-0.3, 0.0,
End of file
```

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 10.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 21

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

```
 1   0.0 -0.6 -1.4 -2.2 -3.0 -4.0 -5.3 -7.1-13.0***************-13.0 -7.1 -5.3 -4.0 -3.0 -2.2 -1.4 -0.6  0.0
 2   0.0 -0.4 -1.1 -1.8 -2.6 -3.7 -5.1 -7.0-11.6***************-12.4 -6.5 -4.3 -3.0 -2.2 -1.7 -1.1 -0.5  0.0
 3   0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0***************-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0
 4   0.0  0.2  0.4  0.6  0.7  0.5 -0.3 -2.7 -8.0***************-13.5 -6.1 -4.3 -2.7 -1.6 -1.0 -0.4 -0.1  0.0
 5   0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0***************-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0
 6   0.0 -0.2 -0.6 -1.0 -1.7 -2.5 -3.7 -5.2-12.9***************-16.5 -5.9 -3.7 -2.0 -1.0 -0.4 -0.1 -0.0  0.0
 7   0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0***************-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0
 8   0.0  0.1  0.3  0.4  0.1 -0.6 -1.7 -4.9-13.7***************-11.2 -6.6 -4.6 -3.1 -2.2 -1.5 -0.9 -0.4  0.0
 9   0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0***************-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0
10   0.0 -0.4 -1.1 -1.7 -2.5 -3.5 -4.3 -6.7-14.4***************-12.6 -6.4 -4.2 -2.7 -1.7 -1.0 -0.5 -0.2  0.0
11   0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0***************-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0
12   0.0 -0.4 -1.0 -1.8 -2.7 -3.8 -5.3 -6.8-10.9***************-11.6 -6.5 -4.3 -2.8 -1.7 -0.9 -0.5 -0.1  0.0
13   0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0***************-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0
14   0.0 -0.1 -0.4 -0.9 -1.6 -2.8 -4.2 -6.3-13.3***************-12.2 -7.5 -5.4 -3.8 -2.9 -2.0 -1.2 -0.5  0.0
15   0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0***************-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
16   0.0  0.0 -0.1 -0.2 -0.4 -1.1 -2.2 -4.2-12.0***************-12.0 -6.5 -4.0 -2.3 -1.3 -0.7 -0.4 -0.2  0.0
17   0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6***************-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0
18   0.0 -0.2 -0.5 -0.9 -1.4 -2.2 -3.3 -5.1-11.6***************-11.4 -5.4 -3.4 -2.2 -1.3 -0.8 -0.5 -0.2  0.0
19   0.0 -0.4 -0.9 -1.6 -2.4 -3.4 -4.7 -6.5-13.0***************-12.0 -5.6 -3.6 -2.4 -1.6 -1.0 -0.6 -0.3  0.0
20   0.0 -0.2 -0.5 -0.9 -1.4 -2.2 -3.3 -5.1-11.8***************-11.4 -5.4 -3.4 -2.2 -1.3 -0.8 -0.5 -0.2  0.0
21   0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6***************-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0
22   0.0  0.0 -0.1 -0.2 -0.4 -1.1 -2.2 -4.2-12.0***************-12.0 -6.5 -4.0 -2.3 -1.3 -0.7 -0.4 -0.2  0.0
23   0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0***************-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
24   0.0 -0.1 -0.4 -0.9 -1.6 -2.8 -4.2 -6.3-13.3***************-12.2 -7.5 -5.4 -3.8 -2.9 -2.0 -1.2 -0.5  0.0
25   0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0***************-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0
26   0.0 -0.4 -1.0 -1.8 -2.7 -3.8 -5.3 -6.8-10.9***************-11.6 -6.5 -4.3 -2.8 -1.7 -0.9 -0.5 -0.1  0.0
27   0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0***************-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0
28   0.0 -0.4 -1.1 -1.7 -2.5 -3.5 -4.3 -6.7-14.4***************-12.6 -6.4 -4.2 -2.7 -1.7 -1.0 -0.5 -0.2  0.0
29   0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0***************-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0
30   0.0  0.1  0.3  0.4  0.1 -0.6 -1.7 -4.9-13.7***************-11.2 -6.6 -4.6 -3.1 -2.2 -1.5 -0.9 -0.4  0.0
31   0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0***************-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0
32   0.0 -0.2 -0.6 -1.0 -1.7 -2.5 -3.7 -5.2-12.9***************-16.5 -5.9 -3.7 -2.0 -1.0 -0.4 -0.1 -0.0  0.0
33   0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0***************-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0
34   0.0  0.2  0.4  0.6  0.7  0.5 -0.3 -2.7 -8.0***************-13.5 -6.1 -4.3 -2.7 -1.6 -1.0 -0.4 -0.1  0.0
35   0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0***************-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0
```

ORIGINAL PAGE IS
OF POOR QUALITY

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ORIGINAL PAGE IS
OF POOR QUALITY

```
36      0.0 -0.1 -1.1 -1.8 -2.6 -3.7 -5.1 -7.0-11.6***************-12.4 -6.5 -4.3 -3.0 -2.2 -1.7 -1.1 -0.5  0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

     1                    0.6414E-01               0.1689E+01

     2                    0.3370E-01               0.1235E+01

     3                    0.3151E-01               0.1145E+01

     4                    0.3451E-01               0.1152E+01

RESULT IS FROM ITERATION:   4
MISSING PART OF THE PROJECTION DATA IN PERCENTS:      14.3

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.7787E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X: -100 -93 -86 -79 -72 -66 -59 -52 -45 -38 -31 -24 -17 -10  -3   3  10  17  24  31  38  45  52  59  66  72  79  86  93 100

 100  ************************************************************************************************************************
  93  ****************************************    0 -23 -52 -23   0   0  -9 -40 -20   0****************************************
  86  ********************************    0   0  -6 -13 -28 -30   0   0  -9 -15 -16 -18   0   0********************************
  79  ****************************    0  -2 -23  -6   0   0  -7 -26   0   0   0   0   0   0 -20 -25   0   0****************************
  72  ********************    0   0 -31  -5   0   0   0 -15 -45 -13   0 -20 -10   0   0   0   0 -20   0   0********************
  66  ****************    0 -20   0   0 -48 -64 -28 -13 -46 -72 -51 -37 -53 -50 -29 -36 -55 -33   0   0 -19   0****************
  59  ************    0   0   0 -29   0   0 -18 -26  -7 -23 -82 -64  57 -76 -36 -17 -16   0   0   0 -32   0  -8 -22************
  52  ************    0 -28   0   0 -26  -4 -26 -54 -40 -32 -69 -64 -66 -75 -37 -25 -23  -9  -8 -35  -7  -2 -50 -17************
  45  ********    0  -7   0 -40   0 -16 -27 -15 -50 -56 -76 -95-115-128 -91 -35  -9 -29 -32 -57 -37  -2 -59  -7 -29   0********
  38  ********    0   0   0 -38  -2 -24 -21 -28 -54 -81-134-161-137-128-100 -51 -46 -84 -84 -58 -31  -4 -53   0 -16   0********
  31  ****  -8 -37   0   0  -9   0 -22 -32 -45 -81 -82-108-178-244-221-141-116-123-142 -86 -26   0   0 -22   0   0 -39  -8****
  24  **** -63 -68 -23 -24 -53 -19 -23 -19 -26 -55 -91-134-287-516-533-334-193-131 -75   0   0   0 -23 -62 -29 -13 -50 -48****
  17  **** -65 -60 -48 -70-113 -84 -78 -39-110-112-229-426-669********-673-404-174 -26 -19 -53 -82 -98-112 -56 -22 -27 -37****
  10  ****  -8 -22 -14 -47 -89-112-121-171-250-278-432-736****************-779-409-166-158-143-110 -94 -55  -9   0   0   0****
   3  ****   0   0   0  -8 -54 -87-105-168-184-245-462************************-514-256-193-141 -44 -14   0   0   0   0   0****
  -3  ****   0   0   0  -8 -54 -87-105-168-184-245-462************************-514-256-193-141 -44 -14   0   0   0   0   0****
 -10  ****  -8 -22 -14 -47 -89-112-121-171-250-278-432-736****************-779-409-166-158-143-110 -94 -55  -9   0   0   0****
```

```
 -17  **** -65 -60 -48 -70-113 -84 -78 -99-110-112-229-426-669********-673-404-174 -26 -19 -53 -82 -98-112 -56 -22 -27 -37****
 -24  **** -63 -68 -23 -24 -53 -19 -23 -19 -26 -55 -91-134-287-516-533-334-193-131 -75   0   0   0 -23 -62 -29 -13 -50 -48****
 -31  ****  -8 -37   0   0  -9   0 -22 -32 -45 -81 -82-108-178-244-221-141-116-123-142 -86 -26   0   0 -22   0   0 -39  -8****
 -38  ********   0   0   0 -38  -2 -24 -21 -28 -54 -81-134-161-137-128-100 -51 -46 -84 -84 -58 -31  -4 -53   0 -16   0********
 -45  ********   0  -7   0 -10   0 -16 -27 -15 -50 -56 -76 -95-115-128 -91 -35  -9 -29 -32 -57 -37  -2 -59  -7 -29   0********
 -52  ************   0 -28   0   0 -26  -4 -26 -54 -40 -32 -69 -64 -66 -75 -37 -25 -23  -9  -8 -35  -7 -12 -50 -17************
 -59  ************   0   0   0 -29   0   0 -18 -26  -7 -23 -82 -64 -57 -76 -36 -17 -16   0   0   0 -32   0  -8 -22************
 -66  ****************   0 -20   0   0 -48 -64 -28 -13 -46 -72 -51 -37 -53 -50 -29 -36 -55 -33   0   0 -19   0****************
 -72  ********************   0   0 -31  -5   0   0   0 -15 -45 -13   0 -20 -10   0   0   0   0 -20   0   0********************
 -79  ************************   0  -2 -23  -6   0   0  -7 -26   0   0   0   0   0   0 -20 -25   0   0************************
 -86  ********************************   0   0  -6 -13 -28 -30   0   0  -9 -15 -16 -18   0   0********************************
 -93  ************************************   0 -23 -52 -23   0   0  -9 -40 -20   0************************************
-100  ****************************************************************************************************************************
```

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```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
-1,0,2,18,21,41,36,20.,5.32E-5,2.27E-4,
9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,
 0.0,-0.6,-1.4,-2.2,-3.0,-4.0,-5.3,-7.1,-13.0,
-13.0,-7.1,-5.3,-4.0,-3.0,-2.2,-1.4,-0.6, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4.9, -9.0,
-12.0,-6.2,-4.1,-2.6,-1.7,-1.2,-0.7,-0.3, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.2,-0.5,-1.2,-3.0,-10.0,
-16.0,-5.8,-4.0,-2.4,-1.3,-0.6,-0.2, 0.0, 0.0,
 0.0,-0.1,-0.3,-0.6,-1.3,-2.3,-3.8,-6.0,-14.0,
-14.0,-6.4,-4.0,-2.3,-1.4,-0.8,-0.4,-0.2, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.3,-0.9,-1.5,-4.8,-14.0,
-11.0,-6.5,-4.6,-3.3,-2.4,-1.6,-0.9,-0.4, 0.0,
 0.0,-0.6,-1.6,-2.6,-3.7,-4.9,-6.2,-7.8,-13.0,
-13.0,-6.5,-4.0,-2.3,-1.2,-0.5,-0.2, 0.0, 0.0,
 0.0,-0.2,-0.4,-0.9,-1.6,-2.6,-4.0,-5.9,-11.0,
-11.0,-6.9,-5.0,-3.6,-2.6,-1.7,-1.0,-0.4, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.5,-2.6,-4.0,-6.0,-14.0,
-13.0,-7.5,-5.0,-3.2,-2.2,-1.5,-0.9,-0.4, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.1,-0.6,-1.4,-3.4,-10.6,
-11.0,-5.5,-3.3,-2.0,-1.0,-0.5,-0.3,-0.1, 0.0,
 0.0,-0.4,-0.9,-1.6,-2.4,-3.4,-4.7,-6.5,-13.0,
-12.0,-5.6,-3.6,-2.4,-1.6,-1.0,-0.6,-0.3, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.1,-0.6,-1.4,-3.4,-10.6,
-11.0,-5.5,-3.3,-2.0,-1.0,-0.5,-0.3,-0.1, 0.0,
 0.0,-0.1,-0.4,-0.8,-1.5,-2.6,-4.0,-6.0,-14.0,
-13.0,-7.5,-5.0,-3.2,-2.2,-1.5,-0.9,-0.4, 0.0,
 0.0,-0.2,-0.4,-0.9,-1.6,-2.6,-4.0,-5.9,-11.0,
-11.0,-6.9,-5.0,-3.6,-2.6,-1.7,-1.0,-0.4, 0.0,
 0.0,-0.6,-1.6,-2.6,-3.7,-4.9,-6.2,-7.8,-13.0,
-13.0,-6.5,-4.0,-2.3,-1.2,-0.5,-0.2, 0.0, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.3,-0.9,-1.5,-4.8,-14.0,
-11.0,-6.5,-4.6,-3.3,-2.4,-1.6,-0.9,-0.4, 0.0,
 0.0,-0.1,-0.3,-0.6,-1.3,-2.3,-3.8,-6.0,-14.0,
-14.0,-6.4,-4.0,-2.3,-1.4,-0.8,-0.4,-0.2, 0.0,
 0.0, 0.0, 0.0, 0.0,-0.2,-0.5,-1.2,-3.0,-10.0,
-16.0,-5.8,-4.0,-2.4,-1.3,-0.6,-0.2, 0.0, 0.0,
 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4.9, -9.0,
-12.0,-6.2,-4.1,-2.6,-1.7,-1.2,-0.7,-0.3, 0.0,

End of file
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A99

ORIGINAL PAGE IS
OF POOR QUALITY

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE ITERATION CONVOLUTION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER)

ZERO OBJECT FIELD OUTSIDE THE RADIUS: 10.000000

INTERPOLATION COEFFICIENT: 2

WAVELENGTH: 0.5320E-04

GLADSTONE-DALE CONSTANT: 0.2270E-03

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED

NUMBER OF PROJECTIONS: 36 NUMBER OF RAYS IN EACH PROJECTION: 21

PROJECTION, PROJECTION FUNCTION IN THE ORDERS OF INTERFERENCE FRINGES:

```
 1   0.0 -0.6 -1.4 -2.2 -3.0 -4.0 -5.3 -7.1-13.0***************-13.0 -7.1 -5.3 -4.0 -3.0 -2.2 -1.4 -0.6  0.0
 2   0.0 -0.4 -1.1 -1.8 -2.6 -3.7 -5.1 -7.0-11.6***************-12.4 -6.5 -4.3 -3.0 -2.2 -1.7 -1.1 -0.5  0.0
 3   0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0***************-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0
 4   0.0  0.2  0.4  0.6  0.7  0.5 -0.3 -2.7 -8.0***************-13.5 -6.1 -4.3 -2.7 -1.6 -1.0 -0.4 -0.1  0.0
 5   0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0***************-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0
 6   0.0 -0.2 -0.6 -1.0 -1.7 -2.5 -3.7 -5.2-12.9***************-16.5 -5.9 -3.7 -2.0 -1.0 -0.4 -0.1 -0.0  0.0
 7   0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0***************-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0
 8   0.0  0.1  0.3  0.4  0.1 -0.6 -1.7 -4.9-13.7***************-11.2 -6.6 -4.6 -3.1 -2.2 -1.5 -0.9 -0.4  0.0
 9   0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0***************-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0
10   0.0 -0.4 -1.1 -1.7 -2.5 -3.5 -4.3 -6.7-14.4***************-12.6 -6.4 -4.2 -2.7 -1.7 -1.0 -0.5 -0.2  0.0
11   0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0***************-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0
12   0.0 -0.4 -1.0 -1.8 -2.7 -3.8 -5.3 -6.8-10.9***************-11.6 -6.5 -4.3 -2.8 -1.7 -0.9 -0.5 -0.1  0.0
13   0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0***************-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0
14   0.0 -0.1 -0.4 -0.9 -1.6 -2.8 -4.2 -6.3-13.3***************-12.2 -7.5 -5.4 -3.8 -2.9 -2.0 -1.2 -0.5  0.0
15   0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0***************-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
16   0.0  0.0 -0.1 -0.2 -0.4 -1.1 -2.2 -4.2-12.0***************-12.0 -6.5 -4.0 -2.3 -1.3 -0.7 -0.4 -0.2  0.0
17   0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6***************-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0
18   0.0 -0.2 -0.5 -0.9 -1.4 -2.2 -3.3 -5.1-11.8***************-11.4 -5.4 -3.4 -2.2 -1.3 -0.8 -0.5 -0.2  0.0
19   0.0 -0.4 -0.9 -1.6 -2.4 -3.4 -4.7 -6.5-13.0***************-12.0 -5.6 -3.6 -2.4 -1.6 -1.0 -0.6 -0.3  0.0
20   0.0 -0.2 -0.5 -0.9 -1.4 -2.2 -3.3 -5.1-11.8***************-11.4 -5.4 -3.4 -2.2 -1.3 -0.8 -0.5 -0.2  0.0
21   0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6***************-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0
22   0.0  0.0 -0.1 -0.2 -0.4 -1.1 -2.2 -4.2-12.0***************-12.0 -6.5 -4.0 -2.3 -1.3 -0.7 -0.4 -0.2  0.0
23   0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0***************-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
24   0.0 -0.1 -0.4 -0.9 -1.6 -2.8 -4.2 -6.3-13.3***************-12.2 -7.5 -5.4 -3.8 -2.9 -2.0 -1.2 -0.5  0.0
25   0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0***************-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0
26   0.0 -0.4 -1.0 -1.8 -2.7 -3.8 -5.3 -6.8-10.9***************-11.6 -6.5 -4.3 -2.8 -1.7 -0.9 -0.5 -0.1  0.0
27   0.0 -0.6 -1.5 -2.6 -3.7 -4.9 -6.2 -7.8-13.0***************-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0
28   0.0 -0.4 -1.1 -1.7 -2.5 -3.5 -4.3 -6.7-14.4***************-12.6 -6.4 -4.2 -2.7 -1.7 -1.0 -0.5 -0.2  0.0
29   0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0***************-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0
30   0.0  0.1  0.3  0.4  0.1 -0.6 -1.7 -4.9-13.7***************-11.2 -6.6 -4.6 -3.1 -2.2 -1.5 -0.9 -0.4  0.0
31   0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0***************-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0
32   0.0 -0.2 -0.6 -1.0 -1.7 -2.5 -3.7 -5.2-12.9***************-16.5 -5.9 -3.7 -2.0 -1.0 -0.4 -0.1 -0.0  0.0
33   0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0***************-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0
34   0.0  0.2  0.4  0.6  0.7  0.5 -0.3 -2.7 -8.0***************-13.5 -6.1 -4.3 -2.7 -1.6 -1.0 -0.4 -0.1  0.0
35   0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0***************-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0
```

36 0.0 -0.4 -1.1 -1.8 -2.6 -3.7 -5.1 -7.0-11.6***************-12.4 -6.5 -4.3 -3.0 -2.2 -1.7 -1.1 -0.5 0.0

ITERATION, RMS OF THE BOUNDARY OBJECT ERROR AND THE AVAILABLE PROJECTION ERROR:

1	0.6414E-01	0.1689E+01
2	0.3370E-01	0.1235E+01
3	0.3151E-01	0.1145E+01
4	0.3451E-01	0.1152E+01

RESULT IS FROM ITERATION: 4
MISSING PART OF THE PROJECTION DATA IN PERCENTS: 14.3

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.8150E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	100.00	**********	5.00	100.00	**********	10.00	100.00	**********	15.00	100.00	**********
	95.00	-2.32		95.00	-13.89		95.00	-54.71		95.00	-71.52
	90.00	-4.42		90.00	-17.61		90.00	-61.91		90.00	-80.39
	85.00	-10.79		85.00	-25.05		85.00	-71.86		85.00	-92.53
	80.00	-13.41		80.00	-29.40		80.00	-79.75		80.00	-103.62
	75.00	-4.05		75.00	-24.69		75.00	-81.67		75.00	-107.87
	70.00	-1.22		70.00	-27.32		70.00	-90.13		70.00	-116.14
	65.00	-3.39		65.00	-32.59		65.00	-98.11		65.00	-124.02
	60.00	0.0		60.00	-29.56		60.00	-95.24		60.00	-121.43
	55.00	-22.39		55.00	-50.68		55.00	-109.18		55.00	-127.29
	50.00	-72.76		50.00	-98.61		50.00	-147.19		50.00	-149.81
	45.00	-132.54		45.00	-155.04		45.00	-190.01		45.00	-172.60
	40.00	-178.99		40.00	-194.13		40.00	-208.91		40.00	-173.13
	35.00	-226.47		35.00	-230.39		35.00	-227.87		35.00	-190.47
	30.00	-291.95		30.00	-292.97		30.00	-296.36		30.00	-284.25
	25.00	-479.25		25.00	-485.76		25.00	-504.17		25.00	-519.09
	20.00	-785.18		20.00	-790.95		20.00	-805.27		20.00	-815.04
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-710.52		-20.00	-714.51		-20.00	-725.83		-20.00	-734.96
	-25.00	-425.53		-25.00	-434.53		-25.00	-459.90		-25.00	-486.47
	-30.00	-245.79		-30.00	-265.17		-30.00	-312.16		-30.00	-345.14
	-35.00	-182.79		-35.00	-211.88		-35.00	-270.28		-35.00	-293.06
	-40.00	-158.67		-40.00	-190.35		-40.00	-247.44		-40.00	-257.64
	-45.00	-163.10		-45.00	-182.77		-45.00	-218.11		-45.00	-215.47
	-50.00	-137.77		-50.00	-148.15		-50.00	-167.81		-50.00	-160.55
	-55.00	-101.59		-55.00	-109.85		-55.00	-126.64		-55.00	-120.89
	-60.00	-82.99		-60.00	-92.66		-60.00	-113.12		-60.00	-109.17
	-65.00	-74.76		-65.00	-89.26		-65.00	-120.28		-65.00	-119.02
	-70.00	-58.71		-70.00	-77.65		-70.00	-118.59		-70.00	-119.73
	-75.00	-57.52		-75.00	-75.38		-75.00	-116.59		-75.00	-116.25

	-80.00	-57.66		-80.00	-75.25		-80.00	-118.24		-80.00	-118.98
	-85.00	-40.90		-85.00	-59.26		-85.00	-106.15		-85.00	-111.17
	-90.00	-28.62		-90.00	-45.74		-90.00	-92.25		-90.00	-98.88
	-95.00	-27.90		-95.00	-41.26		-95.00	-82.13		-95.00	-87.47
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
20.00	100.00	**********	25.00	100.00	**********	30.00	100.00	**********	35.00	100.00	**********
	95.00	-40.82		95.00	-28.89		95.00	-48.46		95.00	-64.17
	90.00	-46.91		90.00	-31.84		90.00	-52.35		90.00	-68.92
	85.00	-57.52		85.00	-38.84		85.00	-59.20		85.00	-77.03
	80.00	-67.18		80.00	-43.35		80.00	-62.15		80.00	-81.97
	75.00	-68.01		75.00	-37.14		75.00	-53.14		75.00	-74.38
	70.00	-71.14		70.00	-31.12		70.00	-42.83		70.00	-68.59
	65.00	-75.39		65.00	-24.31		65.00	-27.43		65.00	-58.47
	60.00	-71.20		60.00	-9.41		60.00	-3.16		60.00	-39.34
	55.00	-72.60		55.00	-6.41		55.00	0.0		55.00	-34.98
	50.00	-86.11		50.00	-18.71		50.00	-8.61		50.00	-52.56
	45.00	-95.37		45.00	-25.40		45.00	-19.33		45.00	-68.62
	40.00	-88.36		40.00	-18.00		40.00	-11.39		40.00	-57.26
	35.00	-122.73		35.00	-64.45		35.00	-47.43		35.00	-69.04
	30.00	-249.12		30.00	-210.36		30.00	-180.27		30.00	-166.71
	25.00	-512.84		25.00	-490.37		25.00	-460.37		25.00	-426.92
	20.00	-814.55		20.00	-806.71		20.00	-792.11		20.00	-768.91
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-738.77		-20.00	-742.46		-20.00	-744.88		-20.00	-740.39
	-25.00	-496.87		-25.00	-493.51		-25.00	-481.19		-25.00	-458.96
	-30.00	-336.92		-30.00	-302.38		-30.00	-260.49		-30.00	-225.68
	-35.00	-253.28		-35.00	-183.59		-35.00	-126.69		-35.00	-99.68
	-40.00	-197.77		-40.00	-116.60		-40.00	-68.70		-40.00	-61.55
	-45.00	-159.96		-45.00	-96.90		-45.00	-67.69		-45.00	-70.21
	-50.00	-113.71		-50.00	-66.21		-50.00	-50.22		-50.00	-55.27
	-55.00	-77.63		-55.00	-36.61		-55.00	-30.62		-55.00	-38.33
	-60.00	-64.39		-60.00	-25.82		-60.00	-28.47		-60.00	-41.71
	-65.00	-67.84		-65.00	-28.96		-65.00	-37.97		-65.00	-54.91
	-70.00	-62.11		-70.00	-23.20		-70.00	-39.63		-70.00	-60.81
	-75.00	-55.26		-75.00	-18.74		-75.00	-39.25		-75.00	-61.46
	-80.00	-57.73		-80.00	-22.83		-80.00	-42.71		-80.00	-63.31
	-85.00	-53.80		-85.00	-21.43		-85.00	-38.07		-85.00	-56.34
	-90.00	-45.42		-90.00	-16.12		-90.00	-29.97		-90.00	-46.93
	-95.00	-38.61		-95.00	-13.50		-95.00	-24.69		-95.00	-39.98
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
40.00	100.00	**********	45.00	100.00	**********	50.00	100.00	**********	55.00	100.00	**********
	95.00	-44.78		95.00	-17.67		95.00	-17.83		95.00	-37.83
	90.00	-48.68		90.00	-18.73		90.00	-18.12		90.00	-40.28
	85.00	-57.95		85.00	-27.09		85.00	-25.12		85.00	-47.57
	80.00	-66.64		80.00	-37.03		80.00	-32.96		80.00	-53.04
	75.00	-63.18		75.00	-34.38		75.00	-27.31		75.00	-44.35
	70.00	-64.13		70.00	-39.26		70.00	-29.23		70.00	-41.23
	65.00	-69.15		65.00	-53.14		65.00	-37.99		65.00	-40.41
	60.00	-65.15		60.00	-57.31		60.00	-35.55		60.00	-27.48
	55.00	-73.03		55.00	-75.55		55.00	-53.32		55.00	-34.41
	50.00	-99.12		50.00	-111.30		50.00	-93.34		50.00	-66.60
	45.00	-119.64		45.00	-139.19		45.00	-129.10		45.00	-102.33
	40.00	-107.40		40.00	-134.35		40.00	-138.00		40.00	-123.19
	35.00	-100.87		35.00	-128.59		35.00	-146.07		35.00	-150.46

A102

	30.00	-167.36
	25.00	-396.35
	20.00	-734.21
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-721.53
	-25.00	-428.80
	-30.00	-198.24
	-35.00	-87.56
	-40.00	-66.77
	-45.00	-75.35
	-50.00	-54.69
	-55.00	-32.02
	-60.00	-32.98
	-65.00	-44.67
	-70.00	-47.62
	-75.00	-47.74
	-80.00	-49.66
	-85.00	-43.82
	-90.00	-36.52
	-95.00	-31.60
	-100.00	**********
60.00	100.00	**********
	95.00	-42.51
	90.00	-47.70
	85.00	-57.54
	80.00	-63.99
	75.00	-56.22
	70.00	-51.96
	65.00	-48.26
	60.00	-33.54
	55.00	-28.63
	50.00	-44.47
	45.00	-69.61
	40.00	-92.91
	35.00	-140.63
	30.00	-197.32
	25.00	-371.81
	20.00	-683.98
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-679.05
	-25.00	-326.89
	-30.00	-133.82
	-35.00	-117.62
	-40.00	-129.68
	-45.00	-124.99
	-50.00	-91.36
	-55.00	-66.21
	-60.00	-63.18

	30.00	-173.06
	25.00	-375.19
	20.00	-699.66
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-697.27
	-25.00	-394.69
	-30.00	-169.39
	-35.00	-82.41
	-40.00	-72.00
	-45.00	-77.15
	-50.00	-49.20
	-55.00	-21.14
	-60.00	-18.11
	-65.00	-27.27
	-70.00	-26.11
	-75.00	-26.47
	-80.00	-30.38
	-85.00	-26.28
	-90.00	-20.74
	-95.00	-18.48
	-100.00	**********
65.00	100.00	**********
	95.00	-27.43
	90.00	-33.46
	85.00	-44.72
	80.00	-52.81
	75.00	-47.28
	70.00	-44.28
	65.00	-44.00
	60.00	-34.43
	55.00	-28.90
	50.00	-37.05
	45.00	-51.01
	40.00	-67.57
	35.00	-124.14
	30.00	-205.05
	25.00	-391.39
	20.00	-692.55
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-682.41
	-25.00	-345.70
	-30.00	-161.01
	-35.00	-145.13
	-40.00	-145.42
	-45.00	-124.96
	-50.00	-82.20
	-55.00	-50.83
	-60.00	-41.93

	30.00	-181.79
	25.00	-364.31
	20.00	-679.87
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-682.12
	-25.00	-359.65
	-30.00	-143.05
	-35.00	-84.45
	-40.00	-84.72
	-45.00	-89.26
	-50.00	-58.14
	-55.00	-29.28
	-60.00	-25.17
	-65.00	-34.00
	-70.00	-32.66
	-75.00	-34.99
	-80.00	-41.28
	-85.00	-36.61
	-90.00	-29.48
	-95.00	-26.20
	-100.00	**********
70.00	100.00	**********
	95.00	-21.90
	90.00	-26.07
	85.00	-34.96
	80.00	-41.48
	75.00	-36.46
	70.00	-35.17
	65.00	-38.50
	60.00	-33.97
	55.00	-38.67
	50.00	-56.25
	45.00	-69.93
	40.00	-75.54
	35.00	-120.35
	30.00	-218.39
	25.00	-420.82
	20.00	-712.16
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-701.80
	-25.00	-384.32
	-30.00	-204.44
	-35.00	-175.22
	-40.00	-160.47
	-45.00	-128.13
	-50.00	-77.37
	-55.00	-36.74
	-60.00	-20.75

	30.00	-191.11
	25.00	-362.89
	20.00	-677.82
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-678.55
	-25.00	-333.02
	-30.00	-129.38
	-35.00	-95.93
	-40.00	-107.85
	-45.00	-111.31
	-50.00	-80.47
	-55.00	-54.10
	-60.00	-51.13
	-65.00	-59.64
	-70.00	-59.33
	-75.00	-62.39
	-80.00	-68.40
	-85.00	-60.72
	-90.00	-50.22
	-95.00	-43.67
	-100.00	**********
75.00	100.00	**********
	95.00	-39.69
	90.00	-44.32
	85.00	-52.44
	80.00	-58.53
	75.00	-54.42
	70.00	-54.89
	65.00	-58.19
	60.00	-54.39
	55.00	-66.33
	50.00	-95.69
	45.00	-116.92
	40.00	-112.10
	35.00	-134.77
	30.00	-237.52
	25.00	-460.32
	20.00	-745.14
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	-740.01
	-25.00	-436.14
	-30.00	-248.10
	-35.00	-197.59
	-40.00	-169.47
	-45.00	-139.77
	-50.00	-94.34
	-55.00	-56.81
	-60.00	-44.11

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ORIGINAL PAGE IS
OF POOR QUALITY

	-65.00	-68.45		-65.00	-44.44		-65.00	-24.04		-65.00	-51.64
	-70.00	-65.84		-70.00	-38.40		-70.00	-18.30		-70.00	-51.15
	-75.00	-65.77		-75.00	-35.94		-75.00	-16.66		-75.00	-50.74
	-80.00	-68.17		-80.00	-36.81		-80.00	-19.88		-80.00	-54.30
	-85.00	-57.93		-85.00	-28.79		-85.00	-17.14		-85.00	-50.71
	-90.00	-46.12		-90.00	-19.93		-90.00	-12.53		-90.00	-44.35
	-95.00	-38.99		-95.00	-15.83		-95.00	-11.50		-95.00	-40.85
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
80.00	100.00	**********	85.00	100.00	**********	90.00	100.00	**********	95.00	100.00	**********
	95.00	-64.14		95.00	-50.64		95.00	-35.96		95.00	-63.66
	90.00	-70.58		90.00	-57.96		90.00	-43.53		90.00	-73.16
	85.00	-79.71		85.00	-68.23		85.00	-54.94		85.00	-86.49
	80.00	-86.51		80.00	-76.01		80.00	-64.40		80.00	-97.85
	75.00	-83.31		75.00	-74.93		75.00	-65.73		75.00	-98.77
	70.00	-84.19		70.00	-77.89		70.00	-70.77		70.00	-100.78
	65.00	-84.88		65.00	-79.13		65.00	-72.13		65.00	-96.78
	60.00	-77.15		60.00	-69.10		60.00	-60.99		60.00	-82.29
	55.00	-87.53		55.00	-75.69		55.00	-63.14		55.00	-80.05
	50.00	-120.96		50.00	-109.53		50.00	-93.26		50.00	-103.31
	45.00	-150.19		45.00	-143.39		45.00	-125.29		45.00	-129.85
	40.00	-142.01		40.00	-139.42		40.00	-128.31		40.00	-137.23
	35.00	-152.88		35.00	-159.70		35.00	-165.52		35.00	-182.58
	30.00	-262.98		30.00	-285.27		30.00	-297.44		30.00	-299.51
	25.00	-501.24		25.00	-524.26		25.00	-528.28		25.00	-518.72
	20.00	-777.03		20.00	-793.67		20.00	-798.54		20.00	-796.84
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-778.30		-20.00	-796.84		-20.00	-798.54		-20.00	-793.67
	-25.00	-487.87		-25.00	-518.72		-25.00	-528.28		-25.00	-524.26
	-30.00	-283.07		-30.00	-299.51		-30.00	-297.44		-30.00	-285.27
	-35.00	-199.99		-35.00	-182.58		-35.00	-165.52		-35.00	-159.70
	-40.00	-160.37		-40.00	-137.23		-40.00	-128.31		-40.00	-139.42
	-45.00	-143.32		-45.00	-129.85		-45.00	-125.29		-45.00	-143.39
	-50.00	-111.84		-50.00	-103.31		-50.00	-93.26		-50.00	-109.53
	-55.00	-86.11		-55.00	-80.05		-55.00	-63.14		-55.00	-75.69
	-60.00	-84.39		-60.00	-82.29		-60.00	-60.99		-60.00	-69.10
	-65.00	-98.12		-65.00	-96.78		-65.00	-72.13		-65.00	-79.13
	-70.00	-103.81		-70.00	-100.78		-70.00	-70.77		-70.00	-77.89
	-75.00	-104.39		-75.00	-98.77		-75.00	-65.73		-75.00	-74.93
	-80.00	-105.98		-80.00	-97.85		-80.00	-64.40		-80.00	-76.01
	-85.00	-97.00		-85.00	-86.49		-85.00	-54.94		-85.00	-68.23
	-90.00	-85.46		-90.00	-73.16		-90.00	-43.53		-90.00	-57.96
	-95.00	-77.14		-95.00	-63.66		-95.00	-35.96		-95.00	-50.64
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
100.00	100.00	**********	105.00	100.00	**********	110.00	100.00	**********	115.00	100.00	**********
	95.00	-77.14		95.00	-40.85		95.00	-11.50		95.00	-15.83
	90.00	-85.46		90.00	-44.35		90.00	-12.53		90.00	-19.93
	85.00	-97.00		85.00	-50.71		85.00	-17.14		85.00	-28.79
	80.00	-105.98		80.00	-54.30		80.00	-19.88		80.00	-36.81
	75.00	-104.39		75.00	-50.74		75.00	-16.66		75.00	-35.94
	70.00	-103.81		70.00	-51.15		70.00	-18.30		70.00	-35.40
	65.00	-98.12		65.00	-51.64		65.00	-24.04		65.00	-44.44
	60.00	-84.39		60.00	-44.11		60.00	-20.74		60.00	-41.93
	55.00	-86.11		55.00	-56.81		55.00	-36.74		55.00	-50.83
	50.00	-111.84		50.00	-94.34		50.00	-77.37		50.00	-82.20

120.00

45.00	-143.32
40.00	-160.37
35.00	-199.99
30.00	-283.07
25.00	-487.87
20.00	-778.30
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-777.03
-25.00	-501.24
-30.00	-262.98
-35.00	-152.88
-40.00	-142.01
-45.00	-150.19
-50.00	-120.96
-55.00	-87.53
-60.00	-77.15
-65.00	-84.88
-70.00	-84.19
-75.00	-83.31
-80.00	-86.51
-85.00	-79.71
-90.00	-70.58
-95.00	-64.14
-100.00	**********
100.00	**********
95.00	-38.99
90.00	-46.12
85.00	-57.93
80.00	-68.17
75.00	-65.77
70.00	-65.84
65.00	-68.45
60.00	-63.18
55.00	-66.21
50.00	-91.36
45.00	-124.99
40.00	-129.68
35.00	-117.62
30.00	-133.82
25.00	-326.89
20.00	-679.05
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-683.98
-25.00	-371.81
-30.00	-197.32
-35.00	-140.63
-40.00	-92.91
-45.00	-69.61

125.00

45.00	-139.77
40.00	-169.47
35.00	-197.59
30.00	-248.10
25.00	-436.14
20.00	-740.01
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-745.14
-25.00	-460.32
-30.00	-237.52
-35.00	-134.77
-40.00	-112.10
-45.00	-116.92
-50.00	-95.69
-55.00	-66.33
-60.00	-54.39
-65.00	-58.19
-70.00	-54.89
-75.00	-54.42
-80.00	-58.53
-85.00	-52.44
-90.00	-44.32
-95.00	-39.69
-100.00	**********
100.00	**********
95.00	-43.67
90.00	-50.22
85.00	-60.72
80.00	-68.40
75.00	-62.39
70.00	-59.33
65.00	-59.64
60.00	-51.13
55.00	-54.10
50.00	-80.47
45.00	-111.31
40.00	-107.85
35.00	-95.93
30.00	-129.38
25.00	-333.02
20.00	-678.55
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-677.82
-25.00	-362.89
-30.00	-191.11
-35.00	-150.46
-40.00	-123.19
-45.00	-102.33

130.00

45.00	-128.13
40.00	-160.47
35.00	-175.22
30.00	-204.44
25.00	-384.32
20.00	-701.80
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-712.16
-25.00	-420.82
-30.00	-218.39
-35.00	-120.35
-40.00	-75.54
-45.00	-69.93
-50.00	-56.25
-55.00	-38.67
-60.00	-33.97
-65.00	-38.50
-70.00	-35.17
-75.00	-36.46
-80.00	-41.48
-85.00	-34.96
-90.00	-26.07
-95.00	-21.90
-100.00	**********
100.00	**********
95.00	-26.20
90.00	-29.48
85.00	-36.61
80.00	-41.28
75.00	-34.99
70.00	-32.66
65.00	-34.00
60.00	-25.17
55.00	-29.28
50.00	-58.14
45.00	-89.26
40.00	-84.72
35.00	-84.45
30.00	-143.05
25.00	-359.65
20.00	-682.12
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-679.87
-25.00	-364.31
-30.00	-181.79
-35.00	-146.07
-40.00	-138.00
-45.00	-129.10

135.00

45.00	-124.96
40.00	-145.42
35.00	-145.13
30.00	-161.01
25.00	-345.70
20.00	-682.41
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-692.55
-25.00	-391.39
-30.00	-205.05
-35.00	-124.14
-40.00	-67.57
-45.00	-51.01
-50.00	-37.05
-55.00	-28.90
-60.00	-34.43
-65.00	-44.00
-70.00	-44.28
-75.00	-47.28
-80.00	-52.81
-85.00	-44.72
-90.00	-33.46
-95.00	-27.43
-100.00	**********
100.00	**********
95.00	-18.48
90.00	-20.74
85.00	-26.28
80.00	-30.38
75.00	-26.47
70.00	-26.11
65.00	-27.27
60.00	-18.11
55.00	-21.14
50.00	-49.20
45.00	-77.15
40.00	-72.00
35.00	-82.41
30.00	-169.39
25.00	-394.69
20.00	-697.27
15.00	**********
10.00	**********
5.00	**********
0.0	**********
-5.00	**********
-10.00	**********
-15.00	**********
-20.00	-699.66
-25.00	-375.19
-30.00	-173.06
-35.00	-128.59
-40.00	-134.35
-45.00	-139.19

A105

ORIGINAL PAGE IS
OF POOR QUALITY

	-50.00	-44.47		-50.00	-66.60		-50.00	-93.34		-50.00	-111.30
	-55.00	-28.63		-55.00	-34.41		-55.00	-53.32		-55.00	-75.55
	-60.00	-33.54		-60.00	-27.48		-60.00	-35.55		-60.00	-57.31
	-65.00	-48.26		-65.00	-40.41		-65.00	-37.99		-65.00	-53.14
	-70.00	-51.96		-70.00	-41.23		-70.00	-29.23		-70.00	-39.26
	-75.00	-56.22		-75.00	-44.35		-75.00	-27.31		-75.00	-34.38
	-80.00	-63.99		-80.00	-53.04		-80.00	-32.96		-80.00	-37.03
	-85.00	-57.54		-85.00	-47.57		-85.00	-25.12		-85.00	-27.09
	-90.00	-47.70		-90.00	-40.28		-90.00	-18.12		-90.00	-18.73
	-95.00	-42.51		-95.00	-37.83		-95.00	-17.83		-95.00	-17.67
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
140.00	100.00	**********	145.00	100.00	**********	150.00	100.00	**********	155.00	100.00	**********
	95.00	-31.60		95.00	-39.98		95.00	-24.69		95.00	-13.50
	90.00	-36.52		90.00	-46.93		90.00	-29.97		90.00	-16.12
	85.00	-43.82		85.00	-56.34		85.00	-38.07		85.00	-21.43
	80.00	-49.66		80.00	-63.31		80.00	-42.71		80.00	-22.83
	75.00	-47.74		75.00	-61.46		75.00	-39.25		75.00	-18.74
	70.00	-47.62		70.00	-60.81		70.00	-39.63		70.00	-23.20
	65.00	-44.67		65.00	-54.91		65.00	-37.97		65.00	-28.96
	60.00	-32.98		60.00	-41.71		60.00	-28.47		60.00	-25.82
	55.00	-32.02		55.00	-38.33		55.00	-30.62		55.00	-36.61
	50.00	-54.69		50.00	-55.27		50.00	-50.22		50.00	-66.21
	45.00	-75.35		45.00	-70.21		45.00	-67.69		45.00	-96.90
	40.00	-66.77		40.00	-61.55		40.00	-68.70		40.00	-116.60
	35.00	-87.56		35.00	-99.68		35.00	-126.69		35.00	-183.59
	30.00	-198.24		30.00	-225.68		30.00	-260.49		30.00	-302.38
	25.00	-428.80		25.00	-458.96		25.00	-481.19		25.00	-493.51
	20.00	-721.53		20.00	-740.39		20.00	-744.88		20.00	-742.46
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	-734.21		-20.00	-768.91		-20.00	-792.11		-20.00	-806.71
	-25.00	-396.35		-25.00	-426.92		-25.00	-460.37		-25.00	-490.37
	-30.00	-167.36		-30.00	-166.71		-30.00	-180.27		-30.00	-210.36
	-35.00	-100.87		-35.00	-69.04		-35.00	-47.43		-35.00	-64.45
	-40.00	-107.40		-40.00	-57.26		-40.00	-11.39		-40.00	-18.00
	-45.00	-119.64		-45.00	-68.62		-45.00	-19.33		-45.00	-25.40
	-50.00	-99.12		-50.00	-52.56		-50.00	-8.61		-50.00	-18.71
	-55.00	-73.03		-55.00	-34.98		-55.00	0.0		-55.00	-6.41
	-60.00	-65.15		-60.00	-39.34		-60.00	-3.16		-60.00	-9.41
	-65.00	-69.15		-65.00	-58.47		-65.00	-27.43		-65.00	-24.31
	-70.00	-64.13		-70.00	-68.59		-70.00	-42.83		-70.00	-31.12
	-75.00	-63.18		-75.00	-74.98		-75.00	-53.14		-75.00	-37.14
	-80.00	-66.64		-80.00	-81.97		-80.00	-62.15		-80.00	-43.35
	-85.00	-57.95		-85.00	-77.03		-85.00	-59.20		-85.00	-38.84
	-90.00	-48.68		-90.00	-68.92		-90.00	-52.35		-90.00	-31.84
	-95.00	-44.78		-95.00	-64.17		-95.00	-48.46		-95.00	-28.89
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
160.00	100.00	**********	165.00	100.00	**********	170.00	100.00	**********	175.00	100.00	**********
	95.00	-38.61		95.00	-87.47		95.00	-82.13		95.00	-41.26
	90.00	-45.42		90.00	-98.88		90.00	-92.25		90.00	-45.74
	85.00	-53.80		85.00	-111.17		85.00	-106.15		85.00	-59.26
	80.00	-57.73		80.00	-118.98		80.00	-118.24		80.00	-75.25
	75.00	-55.26		75.00	-116.25		75.00	-116.59		75.00	-75.38
	70.00	-62.11		70.00	-119.73		70.00	-118.59		70.00	-77.65
	65.00	-67.84		65.00	-119.02		65.00	-120.28		65.00	-89.26

60.00	-64.39	60.00	-109.17	60.00	-113.12	60.00	-92.66
55.00	-77.63	55.00	-120.89	55.00	-126.64	55.00	-109.85
50.00	-113.71	50.00	-160.55	50.00	-167.81	50.00	-148.15
45.00	-159.96	45.00	-215.47	45.00	-218.11	45.00	-182.77
40.00	-197.77	40.00	-257.64	40.00	-247.44	40.00	-190.35
35.00	-253.28	35.00	-293.06	35.00	-270.28	35.00	-211.88
30.00	-336.92	30.00	-345.14	30.00	-312.16	30.00	-265.17
25.00	-496.87	25.00	-486.47	25.00	-459.90	25.00	-434.53
20.00	-738.77	20.00	-734.96	20.00	-725.83	20.00	-714.51
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	-814.55	-20.00	-815.04	-20.00	-805.27	-20.00	-790.95
-25.00	-512.84	-25.00	-519.09	-25.00	-504.17	-25.00	-485.76
-30.00	-249.12	-30.00	-284.25	-30.00	-296.36	-30.00	-292.97
-35.00	-122.73	-35.00	-190.47	-35.00	-227.87	-35.00	-230.39
-40.00	-88.36	-40.00	-173.13	-40.00	-208.91	-40.00	-194.13
-45.00	-95.37	-45.00	-172.60	-45.00	-190.01	-45.00	-155.04
-50.00	-86.11	-50.00	-149.81	-50.00	-147.19	-50.00	-98.61
-55.00	-72.60	-55.00	-127.29	-55.00	-109.18	-55.00	-50.68
-60.00	-71.20	-60.00	-121.43	-60.00	-95.24	-60.00	-29.56
-65.00	-75.39	-65.00	-124.02	-65.00	-98.11	-65.00	-32.59
-70.00	-71.14	-70.00	-116.14	-70.00	-90.13	-70.00	-27.32
-75.00	-68.01	-75.00	-107.87	-75.00	-81.67	-75.00	-24.69
-80.00	-67.18	-80.00	-103.62	-80.00	-79.75	-80.00	-29.40
-85.00	-57.52	-85.00	-92.53	-85.00	-71.86	-85.00	-25.05
-90.00	-46.91	-90.00	-80.39	-90.00	-61.91	-90.00	-17.61
-95.00	-40.82	-95.00	-71.52	-95.00	-54.71	-95.00	-13.39
-100.00	**********	-100.00	**********	-100.00	**********	-100.00	******** *

A 106

A 107

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
 &NAM D=7.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=1,NET=30,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,
0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,
-3.5,-3.,-2.5,-2.,-1.5,-1.,-0.5,0.,0.,.5,1.,1.5,2.,2.5,3.,3.5,-3.5,-3.,-2.5,-2.,-1.5,-1.,-0.5,0.,0.,.5,1.,1.5,2.,2.5,3.,3.5,-3.5,
0.0,0.1,0.5,1.0,1.6,2.2,2.6,2.8,2.8,2.6,2.2,1.6,1.0,0.5,0.1,0.0,0.0,0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0,3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0,0.0
End of file
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ORIGINAL PAGE IS
OF POOR QUALITY

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:       3.500000

WAVELENGTH:                                 0.5320E-04

GLADSTONE-DALE CONSTANT:                    0.2270E-03

TOLERANCE PARAMETER:                        0.1000E-03

NUMBER OF PROJECTIONS:                     18

TOTAL NUMBER OF SAMPLING POINTS:         288

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:          12         12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

     1      0.0          16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.5  1.0  1.6  2.2  2.6  2.8  2.8  2.6  2.2  1.6  1.0  0.5  0.1  0.0

     2     10.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.8  1.3  2.1  2.8  3.0  3.0  2.8  2.1  1.3  0.8  0.4  0.1  0.0

     3     20.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.6  1.2  1.9  2.7  3.0  3.0  2.8  2.2  1.5  0.8  0.3  0.1  0.0

     4     30.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.7  1.2  1.9  2.7  2.9  2.9  2.7  2.1  1.4  0.9  0.5  0.2  0.0

     5     40.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.2  0.7  1.3  2.1  2.5  2.6  2.6  2.3  1.7  1.0  0.5  0.2  0.1  0.0

     6     50.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.0  0.0  0.3  1.0  1.9  2.5  2.7  2.7  2.6  2.2  1.5  0.9  0.4  0.1  0.0

     7     60.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.4  0.8  1.3  1.7  2.4  2.7  2.7  2.4  1.6  1.0  0.5  0.2  0.1  0.0

     8     70.00         16            0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.0  0.2  0.6  1.1  1.7  2.5  2.7  2.7  2.5  2.0  1.6  1.1  0.6  0.3  0.0
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A109


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    9     80.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.5  1.0  1.8  2.6  2.8  2.8  2.7  2.1  1.4  1.0  0.5  0.1  0.0

   10     90.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.5  1.0  1.5  2.2  2.6  2.8  2.8  2.6  2.1  1.4  0.8  0.4  0.1  0.0

   11    100.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.5  1.0  1.8  2.6  2.8  2.8  2.7  2.1  1.4  1.0  0.5  0.1  0.0

   12    110.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.6  1.1  1.7  2.5  2.7  2.7  2.5  2.0  1.6  1.1  0.6  0.3  0.0

   13    120.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.4  0.8  1.3  1.7  2.4  2.7  2.7  2.4  1.6  1.0  0.5  0.2  0.1  0.0

   14    130.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.0  0.3  1.0  1.9  2.5  2.7  2.7  2.6  2.2  1.5  0.9  0.4  0.1  0.0

   15    140.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.2  0.7  1.3  2.1  2.5  2.6  2.6  2.3  1.7  1.0  0.5  0.2  0.1  0.0

   16    150.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.7  1.2  1.9  2.7  2.9  2.9  2.7  2.1  1.4  0.9  0.5  0.2  0.0

   17    160.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.6  1.2  1.9  2.7  3.0  3.0  2.8  2.2  1.5  0.8  0.3  0.1  0.0

   18    170.00       16          0.0         0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.8  1.3  2.1  2.8  3.0  3.0  2.8  2.1  1.3  0.8  0.4  0.1  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:     0.2153E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X:-350-326-302-278-253-229-205-181-157-133-109 -84 -60 -36 -12  12  36  60  84 109 133 157 181 205 229 253 278 302 326 350

 350  *****************************************************************************************************************
 326  ****************************************    0   0   0   0   0   0   0   0   0   0****************************************
 302  ********************************    0   0   5  12  14  14  11   9   8   7   4   0   0   0********************************
 278  ************************  21   9   7  14  22  25  23  19  15  13  14  17  19  17  10   1   0  13************************
 253  ********************  35  10   3  11  21  28  29  26  22  18  16  17  20  23  23  18   7   0   2  28********************
```

C-4

A10

ORIGINAL PAGE IS
OF POOR QUALITY

229				48	11	0	4	17	27	33	35	35	32	30	28	27	28	28	27	22	12	0	0	4	46			
205			59	20	0	0	13	25	35	42	46	48	49	49	47	45	41	38	33	27	18	6	0	0	18	65		
181			40	0	0	12	26	36	44	52	59	66	70	71	70	66	59	51	42	34	26	16	3	0	0	47		
157		71	11	0	12	28	38	45	53	64	75	85	92	95	94	88	79	66	53	42	33	26	17	2	0	14	89	
133		43	0	7	28	42	49	55	64	77	92	105	114	119	118	112	101	85	68	52	41	36	30	17	0	0	54	
109	89	15	0	18	41	52	57	64	76	93	111	126	137	143	143	137	124	106	85	65	51	44	40	30	8	0	17	104
84	78	0	0	27	49	59	64	74	90	110	131	148	160	166	167	161	148	128	104	79	61	51	47	39	16	0	0	84
60	57	0	0	31	54	63	70	83	103	127	150	169	181	188	189	184	171	150	122	94	71	58	52	44	21	0	0	52
36	42	0	0	34	56	65	75	91	115	141	166	185	198	204	206	201	188	166	138	106	80	63	55	47	23	0	0	27
12	34	0	0	34	56	67	77	95	121	149	175	194	207	214	215	211	198	176	146	113	84	66	57	48	24	0	0	14
-12	34	0	0	34	56	67	77	95	121	149	175	194	207	214	215	211	198	176	146	113	84	66	57	48	24	0	0	14
-36	42	0	0	33	56	65	75	91	115	141	166	185	198	205	206	201	188	167	138	106	80	63	55	47	23	0	0	27
-60	57	0	0	31	54	63	70	83	103	128	151	169	181	188	189	184	171	150	123	94	71	58	52	44	21	0	0	51
-84	77	0	0	26	49	59	64	74	90	110	131	148	160	167	167	161	148	129	104	80	61	51	47	38	16	0	0	83
-109	[illegible]	15	0	18	41	52	57	64	76	93	111	126	137	143	143	137	124	106	85	65	51	44	40	29	7	0	17	103
-133		42	0	6	28	42	48	54	64	77	92	105	114	119	119	112	101	85	68	52	41	35	29	17	0	0	54	
-157		71	11	0	12	27	38	45	53	63	75	85	92	95	94	89	79	66	53	42	33	26	16	1	0	14	88	
-181			39	0	0	11	25	35	43	51	59	66	70	71	70	66	59	50	42	33	25	15	2	0	0	47		
-205			58	19	0	0	12	25	34	41	46	48	49	48	47	44	41	37	33	27	18	5	0	0	17	65		
-229				48	10	0	3	16	26	33	35	34	32	29	27	27	27	28	26	21	11	0	0	3	46			
-253					34	9	2	10	20	27	28	25	21	17	15	16	19	22	22	17	6	0	0	27				
-278						20	7	5	13	20	23	22	17	13	12	13	15	17	15	8	0	0	12					
-302								0	0	4	10	13	12	10	8	6	5	2	0	0	0							
-326										0	0	0	0	0	0	0	0	0	0									
-350																												

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )
&NAM D=7.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=-1,NET=15,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16.
0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,
-3.5,-3.,-2.5,-2.,-1.5,-1.,-0.5,0.,0.,.5,1.,1.5,2.,2.5,3.,3.5,-3.5,-3.,-2.5,-2.,-1.5,-1.,-0.5,0.,0.,.5,1.,1.5,2.,2.5,3.,3.5,-3.5,-
0.0,0.1,0.5,1.0,1.6,2.2,2.6,2.8,2.8,2.6,2.2,1.6,1.0,0.5,0.1,0.0,0.0,0.1,0.3,0.8,1.3,2.1,2.8,3.0,3.0,2.8,2.1,1.3,0.8,0.4,0.1,0.0,0.
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ORIGINAL PAGE IS OF POOR QUALITY

RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG., Z = 0.0, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY UNIT IS KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:        3.500000

WAVELENGTH:                                  0.5320E-04

GLADSTONE-DALE CONSTANT:                     0.2270E-03

TOLERANCE PARAMETER:                         0.1000E-03

NUMBER OF PROJECTIONS:                      18

TOTAL NUMBER OF SAMPLING POINTS:          288

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:          12          12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

       1      0.0          16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.5  1.0  1.6  2.2  2.6  2.8  2.8  2.6  2.2  1.6  1.0  0.5  0.1  0.0

       2     10.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.8  1.3  2.1  2.8  3.0  3.0  2.8  2.1  1.3  0.8  0.4  0.1  0.0

       3     20.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.6  1.2  1.9  2.7  3.0  3.0  2.8  2.2  1.5  0.8  0.3  0.1  0.0

       4     30.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.3  0.7  1.2  1.9  2.7  2.9  2.9  2.7  2.1  1.4  0.9  0.5  0.2  0.0

       5     40.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.2  0.7  1.3  2.1  2.5  2.6  2.6  2.3  1.7  1.0  0.5  0.2  0.1  0.0

       6     50.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.0  0.0  0.3  1.0  1.9  2.5  2.7  2.7  2.6  2.2  1.5  0.9  0.4  0.1  0.0

       7     60.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.1  0.4  0.8  1.3  1.7  2.4  2.7  2.7  2.4  1.6  1.0  0.5  0.2  0.1  0.0

       8     70.00         16             0.0         0.0
 -1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
  0.0  0.0  0.2  0.6  1.1  1.7  2.5  2.7  2.7  2.5  2.0  1.6  1.1  0.6  0.3  0.0
```

```
   9       80.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.5  1.0  1.8  2.6  2.8  2.8  2.7  2.1  1.4  1.0  0.5  0.1  0.0

  10       90.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.5  1.0  1.5  2.2  2.6  2.8  2.8  2.6  2.1  1.4  0.8  0.4  0.1  0.0

  11      100.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.5  1.0  1.8  2.6  2.8  2.8  2.7  2.1  1.4  1.0  0.5  0.1  0.0

  12      110.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.2  0.6  1.1  1.7  2.5  2.7  2.7  2.5  2.0  1.6  1.1  0.6  0.3  0.0

  13      120.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.4  0.8  1.3  1.7  2.4  2.7  2.7  2.4  1.6  1.0  0.5  0.2  0.1  0.0

  14      130.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.0  0.0  0.3  1.0  1.9  2.5  2.7  2.7  2.6  2.2  1.5  0.9  0.4  0.1  0.0

  15      140.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.2  0.7  1.3  2.1  2.5  2.6  2.6  2.3  1.7  1.0  0.5  0.2  0.1  0.0

  16      150.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.7  1.2  1.9  2.7  2.9  2.9  2.7  2.1  1.4  0.9  0.5  0.2  0.0

  17      160.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.6  1.2  1.9  2.7  3.0  3.0  2.8  2.2  1.5  0.8  0.3  0.1  0.0

  18      170.00          16              0.0            0.0
-1.00-0.86-0.71-0.57-0.43-0.29-0.14 0.0  0.0  0.14 0.29 0.43 0.57 0.71 0.86 1.00
 0.0  0.1  0.3  0.8  1.3  2.1  2.8  3.0  3.0  2.8  2.1  1.3  0.8  0.4  0.1  0.0
```

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.2163E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	350.00	**********	5.00	350.00	**********	10.00	350.00	**********	15.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.0		300.00	0.0
	250.00	28.86		250.00	29.77		250.00	31.92		250.00	34.02
	200.00	58.26		200.00	58.03		200.00	57.25		200.00	55.83
	150.00	92.55		150.00	92.35		150.00	91.79		150.00	90.96
	100.00	158.61		100.00	158.48		100.00	158.12		100.00	157.57
	50.00	205.64		50.00	205.57		50.00	205.39		50.00	205.09
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	201.42		-50.00	201.38		-50.00	201.25		-50.00	201.02
	-100.00	159.79		-100.00	159.66		-100.00	159.26		-100.00	158.62
	-150.00	102.66		-150.00	102.48		-150.00	101.93		-150.00	101.08

	-200.00	68.63		-200.00	68.55		-200.00	68.24		-200.00	67.48
	-250.00	38.30		-250.00	39.17		-250.00	41.39		-250.00	43.75
	-300.00	0.0		-300.00	0.0		-300.00	0.0		-300.00	0.0
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
20.00	350.00	**********	25.00	350.00	**********	30.00	350.00	**********	35.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.0		300.00	0.0
	250.00	34.62		250.00	32.91		250.00	29.12		250.00	24.55
	200.00	53.70		200.00	51.03		200.00	48.21		200.00	45.79
	150.00	89.97		150.00	89.02		150.00	88.29		150.00	87.97
	100.00	156.88		100.00	156.11		100.00	155.31		100.00	154.57
	50.00	204.69		50.00	204.20		50.00	203.64		50.00	203.03
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	200.72		-50.00	200.35		-50.00	199.93		-50.00	199.49
	-100.00	157.81		-100.00	156.87		-100.00	155.90		-100.00	154.96
	-150.00	100.00		-150.00	98.85		-150.00	97.80		-150.00	97.02
	-200.00	66.08		-200.00	64.02		-200.00	61.53		-200.00	59.07
	-250.00	44.85		-250.00	43.75		-250.00	40.43		-250.00	35.86
	-300.00	0.0		-300.00	0.0		-300.00	0.0		-300.00	0.0
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
40.00	350.00	**********	45.00	350.00	**********	50.00	350.00	**********	55.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.0		300.00	1.13
	250.00	20.92		250.00	19.61		250.00	20.91		250.00	23.85
	200.00	44.31		200.00	44.11		200.00	45.13		200.00	46.95
	150.00	88.19		150.00	89.00		150.00	90.36		150.00	92.10
	100.00	153.91		100.00	153.38		100.00	152.98		100.00	152.72
	50.00	202.38		50.00	201.70		50.00	201.02		50.00	200.36
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	199.04		-50.00	198.60		-50.00	198.15		-50.00	197.83
	-100.00	154.12		-100.00	153.42		-100.00	152.88		-100.00	152.52
	-150.00	96.66		-150.00	96.80		-150.00	97.42		-150.00	98.40
	-200.00	57.18		-200.00	56.26		-200.00	56.39		-200.00	57.27
	-250.00	31.60		-250.00	29.07		-250.00	28.88		-250.00	30.56
	-300.00	0.0		-300.00	0.0		-300.00	0.0		-300.00	4.19
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
60.00	350.00	**********	65.00	350.00	**********	70.00	350.00	**********	75.00	350.00	**********
	300.00	9.25		300.00	14.50		300.00	15.72		300.00	13.85
	250.00	26.74		250.00	27.96		250.00	26.76		250.00	23.63
	200.00	48.95		200.00	50.56		200.00	51.45		200.00	51.70
	150.00	94.04		150.00	95.98		150.00	97.75		150.00	99.25
	100.00	152.56		100.00	152.47		100.00	152.44		100.00	152.42
	50.00	199.72		50.00	199.12		50.00	198.58		50.00	198.09
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	197.52		-50.00	197.27		-50.00	197.11		-50.00	197.03
	-100.00	152.31		-100.00	152.23		-100.00	152.25		-100.00	152.33
	-150.00	99.57		-150.00	100.73		-150.00	101.69		-150.00	102.34
	-200.00	58.34		-200.00	59.00		-200.00	58.80		-200.00	57.68
	-250.00	32.74		-250.00	33.83		-250.00	32.71		-250.00	29.25
	-300.00	11.24		-300.00	16.97		-300.00	19.79		-300.00	19.29
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
80.00	350.00	**********	85.00	350.00	**********	90.00	350.00	**********	95.00	350.00	**********
	300.00	11.09		300.00	9.64		300.00	10.62		300.00	13.76
	250.00	20.03		250.00	17.69		250.00	17.84		250.00	20.67
	200.00	51.69		200.00	51.93		200.00	52.77		200.00	54.28
	150.00	100.46		150.00	101.38		150.00	102.03		150.00	102.39
	100.00	152.40		100.00	152.36		100.00	152.30		100.00	152.21
	50.00	197.67		50.00	197.33		50.00	197.07		50.00	196.89
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	197.03		-50.00	197.12		-50.00	197.30		-50.00	197.56
	-100.00	152.43		-100.00	152.53		-100.00	152.62		-100.00	152.69
	-150.00	102.63		-150.00	102.57		-150.00	102.21		-150.00	101.57

ORIGINAL PAGE IS
OF POOR QUALITY

A114

A115

ORIGINAL PAGE IS
OF POOR QUALITY

	-200.00	5[illegible].92		-200.00	54.03		-200.00	52.52		-200.00	51.68
	-250.00	24.40		-250.00	19.76		-250.00	16.92		-250.00	16.78
	-300.00	16.25		-300.00	12.26		-300.00	9.11		-300.00	8.14
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
100.00	350.00	**********	105.00	350.00	**********	110.00	350.00	**********	115.00	350.00	**********
	300.00	17.74		300.00	20.74		300.00	21.20		300.00	18.33
	250.00	25.30		250.00	30.13		250.00	33.56		250.00	34.66
	200.00	56.16		200.00	57.92		200.00	59.04		200.00	59.22
	150.00	102.45		150.00	102.16		150.00	101.51		150.00	100.56
	100.00	152.11		100.00	152.01		100.00	151.94		100.00	151.94
	50.00	196.81		50.00	196.81		50.00	196.89		50.00	197.07
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	197.90		-50.00	198.3[illegible]		-50.00	198.79		-50.00	199.33
	-100.00	152.72		-100.00	152.74		-100.00	152.75		-100.00	152.77
	-150.00	100.64		-150.00	99.43		-150.00	97.92		-150.00	96.14
	-200.00	51.45		-200.00	51.46		-200.00	51.21		-200.00	50.33
	-250.00	19.13		-250.00	22.75		-250.00	25.90		-250.00	27.13
	-300.00	9.6[illegible]		-300.00	12.39		-300.00	14.31		-300.00	13.14
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
120.00	350.00	**********	125.00	350.00	**********	130.00	350.00	**********	135.00	350.00	**********
	300.00	12.54		300.00	5.42		300.00	0.0		300.00	0.0
	250.00	33.53		250.00	31.30		250.00	29.58		250.00	29.71
	200.00	58.56		200.00	57.47		200.00	56.58		200.00	56.44
	150.00	99.41		150.00	98.25		150.00	97.28		150.00	96.67
	100.00	152.03		100.00	152.25		100.00	152.63		100.00	153.19
	50.00	197.32		50.00	197.64		50.00	198.02		50.00	198.44
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	199.92		-50.00	200.55		-50.00	201.20		-50.00	201.86
	-100.00	152.84		-100.00	152.98		-100.00	153.23		-100.00	153.61
	-150.00	94.20		-150.00	92.25		-150.00	90.50		-150.00	89.13
	-200.00	48.74		-200.00	46.75		-200.00	44.94		-200.00	43.94
	-250.00	25.95		-250.00	23.10		-250.00	20.21		-250.00	18.97
	-300.00	7.95		-300.00	0.0		-300.00	0.0		-300.00	0.0
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
140.00	350.00	**********	145.00	350.00	**********	150.00	350.00	**********	155.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.0		300.00	0.0
	250.00	32.19		250.00	36.39		250.00	40.88		250.00	44.13
	200.00	57.35		200.00	59.21		200.00	61.65		200.00	64.12
	150.00	96.54		150.00	96.91		150.00	97.71		150.00	98.78
	100.00	153.91		100.00	154.77		100.00	155.74		100.00	156.73
	50.00	198.90		50.00	199.36		50.00	199.82		50.00	200.25
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	202.52		-50.00	203.16		-50.00	203.76		-50.00	204.30
	-100.00	154.12		-100.00	154.76		-100.00	155.48		-100.00	156.24
	-150.00	88.31		-150.00	88.07		-150.00	88.38		-150.00	89.10
	-200.00	44.15		-200.00	45.64		-200.00	48.08		-200.00	50.93
	-250.00	20.34		-250.00	24.02		-250.00	28.67		-250.00	32.52
	-300.00	0.0		-300.00	0.0		-300.00	0.0		-300.00	0.0
	-350.00	**********		-350.00	**********		-350.00	**********		-350.00	**********
160.00	350.00	**********	165.00	350.00	**********	170.00	350.00	**********	175.00	350.00	**********
	300.00	0.0		300.00	0.0		300.00	0.0		300.00	0.0
	250.00	45.16		250.00	43.99		250.00	41.55		250.00	39.25
	200.00	66.17		200.00	67.55		200.00	68.28		200.00	68.57
	150.00	99.94		150.00	101.03		150.00	101.90		150.00	102.46
	100.00	157.69		100.00	158.54		100.00	159.21		100.00	159.63
	50.00	200.64		50.00	200.96		50.00	201.21		50.00	201.36
	0.0	216.34		0.0	216.34		0.0	216.34		0.0	216.34
	-50.00	204.77		-50.00	205.15		-50.00	205.43		-50.00	205.59
	-100.00	156.99		-100.00	157.66		-100.00	158.18		-100.00	158.51
	-150.00	90.04		-150.00	91.01		-150.00	91.83		-150.00	92.37

-200.00	53.62	-200.00	55.76	-200.00	57.21	-200.00	58.01
-250.00	34.31	-250.00	33.78	-250.00	31.76	-250.00	29.69
-300.00	0.0	-300.00	0.0	-300.00	0.0	-300.00	0.0
-350.00**********		-350.00**********		-350.00**********		-350.00**********	

ORIGINAL PAGE IS
OF POOR QUALITY

A116

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
 &NAM D=16.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=1,NET=30,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,
-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.:
-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,:
 0.0,-0.2,-0.4,-0.7,-1.0,-1.8,-3.5,-3.5,-1.8,-1.0,-0.7,-0.4,-0.2, 0.0, 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2,-4.0,-2.3,-1.3,-0.7,-0.3,
End of file
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:        8.000000

WAVELENGTH:                                  0.5320E-04

GLADSTONE-DALE CONSTANT:                     0.2270E-03

TOLERANCE PARAMETER:                         0.1000E-03

NUMBER OF PROJECTIONS:                      18

TOTAL NUMBER OF SAMPLING POINTS:           252

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:          12          12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

     1     0.0        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.4 -0.7 -1.0 -1.8 -3.5 -3.5 -1.8 -1.0 -0.7 -0.4 -0.2  0.0

     2    10.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2 -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0

     3    20.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.0 -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

     4    30.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2 -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0

     5    40.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2 -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0

     6    50.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0 -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0

     7    60.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5 -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0

     8    70.00       14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1 -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0
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A119

ORIGINAL PAGE IS OF POOR QUALITY

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    9      80.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9 -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0

   10      90.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.1 -0.3 -0.7 -1.4 -2.2 -3.2 -2.9 -1.8 -1.1 -0.6 -0.2 -0.1  0.0

   11     100.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9 -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0

   12     110.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1 -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0

   13     120.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5 -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0

   14     130.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0 -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0

   15     140.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2 -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0

   16     150.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2 -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0

   17     160.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.9 -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

   18     170.00        14            -0.2200E+01    0.2200E+01
-1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
 0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2 -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:     0.1387E+00

X AND Y COORDINATES MULTIPLIED BY:      0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY:      0.100E+04

Y \ X:-800-745-690-634-579-524-469-414-359-303-248-193-138 -83 -28  28  83 138 193 248 303 359 414 469 524 579 634 690 745 800

 800  ************************************************************************************************************************
 745  ****************************************  -25 -27 -24 -22 -20 -19 -17 -14  -8   0*******************************************
 690  ********************************  -21 -22 -16 -10  -6  -4  -4  -5  -7  -7  -6  -2   0   0***********************************
 634  ************************  -1 -16 -19 -15 -11  -9  -9 -10 -11 -12 -13 -13 -13 -11  -6   0   0   0***************************
 579  ********************   0  -7 -15 -15 -15 -17 -20 -24 -27 -28 -27 -25 -22 -20 -18 -15  -8   0   0   0*********************
```

A120

ORIGINAL PAGE IS
OF POOR QUALITY

```
 524 ****************   0   0  -9 -11 -13 -17 -24 -32 -39 -43 -44 -40 -33 -26 -21 -18 -16 -12  -5   0   0   0****************
 469 ************   0   0  -4  -7  -7 -11 -18 -27 -38 -48 -54 -55 -50 -39 -28 -18 -13 -12 -11  -9  -3   0   0   0************
 414 ************   0  -4  -8  -4  -4  -9 -17 -28 -41 -54 -64 -66 -60 -47 -31 -17  -9  -7  -9 -10  -8  -5   0   0************
 359 ********   0  -2 -14  -8  -3  -4  -9 -16 -28 -44 -61 -76 -82 -77 -62 -42 -22 -10  -6  -9 -13 -13 -12 -12  -8   0********
 303 ********   0 -22 -17  -8  -6  -8 -12 -19 -31 -50 -73 -94-106-103 -87 -63 -38 -20 -13 -15 -19 -20 -18 -18 -21 -10********
 248 ****   0 -13 -28 -16  -9 -11 -16 -19 -25 -38 -61 -91-120-138-139-122 -93 -63 -39 -27 -26 -28 -26 -22 -19 -24 -24   0****
 193 ****   0 -28 -26 -13 -12 -20 -26 -29 -34 -49 -76-113****************-130 -94 -64 -47 -42 -41 -37 -27 -18 -20 -28  -2****
 138 ****   0 -31 -20  -9 -16 -29 -37 -40 -44 -61 -93************************-126 -90 -68 -58 -54 -46 -31 -16 -13 -24  -9****
  83 ****   0 -29 -14  -7 -20 -37 -47 -49 -54 -71********************************-111 -85 -72 -65 -53 -34 -13  -7 -17 -11****
  28 ****  -1 -27 -10  -6 -22 -42 -52 -54 -59 -77********************************-123 -94 -79 -71 -57 -35 -12  -3 -13 -10****
 -28 ****  -1 -27 -10  -6 -22 -42 -52 -54 -59 -77********************************-123 -94 -79 -71 -57 -35 -12  -2 -13 -10****
 -83 ****   0 -29 -14  -7 -20 -37 -47 -49 -54 -71********************************-111 -85 -72 -65 -53 -34 -13  -7 -17 -11****
-138 ****   0 -31 -20  -9 -16 -29 -37 -40 -45 -61 -93************************-126 -90 -68 -58 -54 -46 -31 -16 -13 -24  -9****
-193 ****   0 -28 -26 -12 -12 -20 -26 -29 -34 -49 -76-113****************-131 -94 -64 -47 -42 -41 -37 -27 -18 -20 -28  -2****
-248 ****   0 -13 -28 -16  -9 -11 -16 -19 -25 -38 -61 -91-120-138-139-122 -94 -63 -39 -27 -26 -28 -28 -22 -19 -24 -24   0****
-303 ********   0 -21 -17  -8  -5  -8 -12 -19 -31 -50 -73 -94-106-104 -87 -63 -38 -20 -13 -15 -18 -19 -17 -17 -21 -10********
-359 ********   0  -2 -14  -8  -3  -4  -9 -16 -28 -44 -61 -76 -82 -77 -62 -42 -22 -10  -6  -9 -12 -13 -12 -11  -8   0********
-414 ************   0  -3  -7  -4  -4  -9 -17 -28 -41 -54 -64 -66 -60 -47 -31 -17  -9  -7  -8 -10  -8  -4   0   0************
-469 ************   0   0  -4  -7  -7 -10 -17 -27 -38 -48 -54 -55 -50 -39 -28 -18 -13 -11 -11  -8  -2   0   0   0************
-524 ****************   0   0  -8 -11 -13 -17 -24 -31 -38 -43 -43 -40 -33 -26 -21 -18 -15 -12  -5   0   0   0****************
-579 ********************   0  -6 -14 -15 -15 -17 -20 -24 -27 -28 -27 -24 -22 -19 -18 -14  -7   0   0   0********************
-634 ************************  -1 -15 -18 -15 -11  -9  -9 -10 -11 -12 -12 -13 -13 -11  -6   0   0   0************************
-690 ******************************** -20 -21 -15  -9  -5  -3  -4  -5  -6  -7  -6  -2   0   0********************************
-745 ************************************** -25 -26 -24 -21 -19 -18 -17 -13  -7   0**************************************
-800 ************************************************************************************************************************
```

```
NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
&NAM D=16.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=-1,NET=33,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,14,
-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2,2.2,-2.2
-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,6.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3
0.0,-0.2,-0.4,-0.7,-1.0,-1.8,-3.5,-3.5,-1.8,-1.0,-0.7,-0.4,-0.2, 0.0, 0.0,-0.2,-0.5,-.95,-1.2,-2.2,-3.2,-4.0,-2.3,-1.3,-0.7,-0.3,
End of file
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ORIGINAL PAGE IS OF POOR QUALITY

A121

A122

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                         RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

                            (BY THE SERIES EXPANSION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 1.27, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:         8.000000

WAVELENGTH:                                   0.5320E-04

GLADSTONE-DALE CONSTANT:                      0.2270E-03

TOLERANCE PARAMETER:                          0.1000E-03

NUMBER OF PROJECTIONS:                       18

TOTAL NUMBER OF SAMPLING POINTS:            252

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:              12         12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

    1      0.0         14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.4 -0.7 -1.0 -1.8 -3.5 -3.5 -1.8 -1.0 -0.7 -0.4 -0.2  0.0

    2     10.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2 -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0

    3     20.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.9 -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

    4     30.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2 -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0

    5     40.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2 -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0

    6     50.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0 -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0

    7     60.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5 -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0

    8     70.00        14          -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1 -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0
```

```
    9      80.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9 -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0

   10      90.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.1 -0.3 -0.7 -1.4 -2.2 -3.2 -2.9 -1.8 -1.1 -0.6 -0.2 -0.1  0.0

   11     100.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0  0.0 -0.2 -0.5 -1.1 -1.9 -2.9 -3.2 -2.0 -1.2 -0.6 -0.3 -0.1  0.0

   12     110.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.1 -0.4 -0.9 -1.6 -2.7 -4.1 -2.9 -1.8 -1.0 -0.6 -0.3 -0.1  0.0

   13     120.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.4 -0.8 -1.2 -1.9 -3.5 -3.5 -2.4 -1.5 -0.9 -0.5 -0.2  0.0

   14     130.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.6 -1.2 -2.0 -2.9 -5.0 -3.5 -1.9 -1.2 -0.7 -0.4 -0.2  0.0

   15     140.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.3 -0.8 -1.3 -2.0 -2.9 -5.2 -3.7 -2.8 -2.0 -1.2 -0.6 -0.2  0.0

   16     150.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0  0.0 -0.1 -0.5 -1.2 -2.2 -4.2 -3.0 -1.5 -0.7 -0.3 -0.1  0.0  0.0

   17     160.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.7 -1.2 -1.8 -2.6 -3.9 -2.8 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

   18     170.00          14              -0.2200E+01    0.2200E+01
 -1.00-0.88-0.75-0.63-0.50-0.38-0.25 0.25 0.38 0.50 0.63 0.75 0.88 1.00
  0.0 -0.2 -0.5 -0.9 -1.2 -2.2 -3.2 -4.0 -2.3 -1.3 -0.7 -0.3 -0.1  0.0
```

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION: 0.1394E+00

THE RADIUS R IS MULTIPLIED BY: 0.100E+03

THE OBJECT FUNCTION MULTIPLIED BY: 0.100E+04

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	800.00	**********	5.00	800.00	**********	10.00	800.00	**********	15.00	800.00	**********
	750.00	-7.38		750.00	-9.48		750.00	-14.21		750.00	-17.89
	700.00	-14.68		700.00	-16.82		700.00	-21.81		700.00	-26.29
	650.00	-3.35		650.00	-5.50		650.00	-10.82		650.00	-16.61
	600.00	-5.46		600.00	-7.16		600.00	-11.44		600.00	-16.36
	550.00	-23.64		550.00	-24.46		550.00	-26.43		550.00	-28.35
	500.00	-46.33		500.00	-46.21		500.00	-45.60		500.00	-43.91
	450.00	-63.59		450.00	-62.77		450.00	-60.27		450.00	-55.94
	400.00	-73.70		400.00	-72.60		400.00	-69.35		400.00	-64.07
	350.00	-82.20		350.00	-81.19		350.00	-78.25		350.00	-73.60
	300.00	-97.08		300.00	-96.38		300.00	-94.36		300.00	-91.23

A124

	250.00	-123.72
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-77.39
	-300.00	-60.21
	-350.00	-55.12
	-400.00	-53.69
	-450.00	-47.10
	-500.00	-31.76
	-550.00	-13.23
	-600.00	-4.39
	-650.00	-14.13
	-700.00	-27.33
	-750.00	0.0
	-800.00	**********
20.00	800.00	**********
	750.00	-16.88
	700.00	-26.84
	650.00	-20.01
	600.00	-19.77
	550.00	-28.85
	500.00	-40.57
	450.00	-49.75
	400.00	-57.05
	350.00	-67.61
	300.00	-87.29
	250.00	-119.01
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-77.87
	-300.00	-55.48
	-350.00	-44.70
	-400.00	-39.60
	-450.00	-33.54
	-500.00	-23.58
	-550.00	-13.32
	-600.00	-11.23
	-650.00	-21.63
	-700.00	-29.33
	-750.00	0.0
	-800.00	**********
40.00	800.00	**********
	750.00	0.0
	700.00	0.0
	650.00	-5.97
	600.00	-11.06

	250.00	-123.36
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-77.37
	-300.00	-59.82
	-350.00	-54.33
	-400.00	-52.68
	-450.00	-46.18
	-500.00	-31.32
	-550.00	-13.54
	-600.00	-5.40
	-650.00	-15.44
	-700.00	-28.45
	-750.00	0.0
	-800.00	**********
25.00	800.00	**********
	750.00	-9.84
	700.00	-21.98
	650.00	-19.45
	600.00	-20.33
	550.00	-27.13
	500.00	-35.30
	450.00	-41.94
	400.00	-48.78
	350.00	-60.81
	300.00	-83.00
	250.00	-117.13
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-78.85
	-300.00	-54.14
	-350.00	-40.73
	-400.00	-33.70
	-450.00	-27.34
	-500.00	-18.88
	-550.00	-10.93
	-600.00	-10.01
	-650.00	-18.77
	-700.00	-22.91
	-750.00	0.0
	-800.00	**********
45.00	800.00	**********
	750.00	0.0
	700.00	0.0
	650.00	-4.84
	600.00	-9.48

	250.00	-122.36
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-77.35
	-300.00	-58.73
	-350.00	-52.09
	-400.00	-49.74
	-450.00	-43.47
	-500.00	-29.92
	-550.00	-14.16
	-600.00	-7.86
	-650.00	-18.53
	-700.00	-30.78
	-750.00	0.0
	-800.00	**********
30.00	800.00	**********
	750.00	0.0
	700.00	-13.00
	650.00	-15.41
	600.00	-18.11
	550.00	-23.24
	500.00	-28.47
	450.00	-33.10
	400.00	-39.97
	350.00	-53.89
	300.00	-78.83
	250.00	-115.48
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-80.61
	-300.00	-53.61
	-350.00	-37.48
	-400.00	-28.38
	-450.00	-21.45
	-500.00	-14.04
	-550.00	-7.74
	-600.00	-7.21
	-650.00	-13.71
	-700.00	-14.52
	-750.00	0.0
	-800.00	**********
50.00	800.00	**********
	750.00	0.0
	700.00	0.0
	650.00	-6.75
	600.00	-10.15

	250.00	-120.84
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
	0.0	**********
	-50.00	**********
	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-77.45
	-300.00	-57.16
	-350.00	-48.71
	-400.00	-45.19
	-450.00	-39.13
	-500.00	-27.36
	-550.00	-14.33
	-600.00	-10.30
	-650.00	-21.29
	-700.00	-31.82
	-750.00	0.0
	-800.00	**********
35.00	800.00	**********
	750.00	0.0
	700.00	-3.23
	650.00	-10.05
	600.00	-14.42
	550.00	-18.15
	500.00	-20.95
	450.00	-24.16
	400.00	-31.53
	350.00	-47.58
	300.00	-75.30
	250.00	-114.36
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	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
	-250.00	-83.35
	-300.00	-54.32
	-350.00	-35.68
	-400.00	-24.55
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	-500.00	-10.15
	-550.00	-4.95
	-600.00	-4.32
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	-700.00	-7.40
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55.00	800.00	**********
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	700.00	-0.50
	650.00	-10.35
	600.00	-12.5[illegible]

	550.00	-13.24		550.00	-9.83		550.00	-8.65		550.00	-9.78
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	200.00	**********		200.00	**********		200.00	**********		200.00	**********
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	-500.00	-8.30		-500.00	-9.26		-500.00	-13.17		-500.00	-19.50
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	-600.00	-3.03		-600.00	-4.26		-600.00	-7.85		-600.00	-12.69
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	-700.00	-4.30		-700.00	-5.85		-700.00	-10.23		-700.00	-14.41
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60.00	800.00	**********	65.00	800.00	**********	70.00	800.00	**********	75.00	800.00	**********
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	650.00	-13.83		650.00	-15.81		650.00	-15.88		650.00	-14.44
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	550.00	-12.71		550.00	-16.75		550.00	-21.23		550.00	-25.66
	500.00	-9.59		500.00	-14.91		500.00	-21.69		500.00	-29.10
	450.00	-11.44		450.00	-17.71		450.00	-25.85		450.00	-34.87
	400.00	-22.60		400.00	-29.24		400.00	-37.63		400.00	-46.74
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	300.00	-79.64		300.00	-85.01		300.00	-91.02		300.00	-97.01
	250.00	-122.25		250.00	-126.15		250.00	-130.19		250.00	-133.92
	200.00	**********		200.00	**********		200.00	**********		200.00	**********
	150.00	**********		150.00	**********		150.00	**********		150.00	**********
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	-500.00	-27.25		-500.00	-35.18		-500.00	-42.12		-500.00	-47.15
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	-600.00	-17.35		-600.00	-20.73		-600.00	-22.45		-600.00	-22.78
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A126

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	650.00	-12.23
	600.00	-21.45
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	500.00	-36.32
	450.00	-43.68
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	300.00	-102.29
	250.00	-136.93
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	-100.00	**********
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	-600.00	-22.35
	-650.00	-7.95
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85.00	800.00	**********
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	700.00	-6.36
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	600.00	-21.52
	550.00	-33.24
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90.00	800.00	**********
	750.00	-21.92
	700.00	-5.34
	650.00	-8.29
	600.00	-21.68
	550.00	-35.96
	500.00	-47.28
	450.00	-56.75
	400.00	-67.93
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	300.00	-108.34
	250.00	-139.24
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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	-650.00	-7.84
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95.00	800.00	**********
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	700.00	-4.52
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	600.00	-22.10
	550.00	-37.63
	500.00	-49.83
	450.00	-59.49
	400.00	-70.14
	350.00	-85.63
	300.00	-108.28
	250.00	-138.06
	200.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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	-650.00	-9.53
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	-750.00	-18.16
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100.00	800.00	**********
	750.00	-20.74
	700.00	-4.81
	650.00	-8.40
	600.00	-22.70
	550.00	-37.96
	500.00	-49.87
	450.00	-59.13
	400.00	-69.23
	350.00	-84.02
	300.00	-105.97
	250.00	-135.24
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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105.00	800.00	**********
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	550.00	-36.65
	500.00	-47.27
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	300.00	-101.56
	250.00	-130.88
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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110.00	800.00	**********
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	700.00	-10.69
	650.00	-13.05
	600.00	-22.78
	550.00	-33.50
	500.00	-42.24
	450.00	-49.70
	400.00	-58.93
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	300.00	-95.43
	250.00	-125.24
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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	-350.00	-59.45
	-400.00	-37.67
	-450.00	-25.82

115.00	800.00	**********
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	650.00	-14.98
	600.00	-21.05
	550.00	-28.57
	500.00	-35.30
	450.00	-41.87
	400.00	-50.92
	350.00	-65.61
	300.00	-88.12
	250.00	-118.68
	200.00	**********
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	100.00	**********
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	-200.00	**********
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	-350.00	-51.86
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ORIGINAL PAGE IS
OF POOR QUALITY

A127

	-500.00	-36.19
	-550.00	-29.50
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	-650.00	-11.78
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120.00	800.00	**********
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	700.00	-16.35
	650.00	-15.06
	600.00	-17.66
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	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********

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	-800.00	**********
125.00	800.00	**********
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	700.00	-14.84
	650.00	-12.90
	600.00	-12.98
	550.00	-15.53
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	300.00	-72.70
	250.00	-104.59
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	600.00	-4.54
	550.00	-5.08
	500.00	-10.22
	450.00	-16.92
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	300.00	-54.24
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	100.00	**********
	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********

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130.00	800.00	**********
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	600.00	-8.12
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	500.00	-13.26
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150.00	800.00	**********
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	650.00	-13.94
	600.00	-7.39
	550.00	-7.86
	500.00	-14.10
	450.00	-21.47
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	-100.00	**********
	-150.00	**********

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	-800.00	**********
135.00	800.00	**********
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	600.00	-4.50
	550.00	-5.45
	500.00	-9.35
	450.00	-15.31
	400.00	-24.10
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	300.00	-60.38
	250.00	-92.02
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	50.00	**********
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	-100.00	**********
	-150.00	**********
	-200.00	**********
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	-350.00	-39.70
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	-500.00	-8.67
	-550.00	-9.66
	-600.00	-9.23
	-650.00	-4.52
	-700.00	0.0
	-750.00	0.0
	-800.00	**********
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	600.00	-10.16
	550.00	-11.03
	500.00	-18.93
	450.00	-27.36
	400.00	-33.68
	350.00	-40.68
	300.00	-54.08
	250.00	-78.78
	200.00	**********
	150.00	**********
	100.00	**********
	50.00	**********
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	-50.00	**********
	-100.00	**********
	-150.00	**********

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-500.00	-13.90	-20.87	-28.40	-35.25
-550.00	-13.09	-18.01	-23.13	-27.03
-600.00	-10.83	-14.22	-17.94	-20.18
-650.00	-5.68	-9.79	-15.18	-19.25
-700.00	0.0	-2.93	-12.74	-21.76
-750.00	0.0	0.0	0.0	-9.63
-800.00	**********	**********	**********	**********
800.00	**********	**********	**********	**********
750.00	0.0	0.0	0.0	0.0
700.00	-29.51	-31.96	-30.87	-28.49
650.00	-21.79	-21.41	-18.61	-15.48
600.00	-11.35	-10.39	-7.92	-5.43
550.00	-13.40	-14.39	-14.20	-13.56
500.00	-23.62	-27.39	-29.94	-31.33
450.00	-33.55	-39.14	-43.48	-46.19
400.00	-39.58	-45.18	-49.73	-52.67
350.00	-44.67	-48.68	-52.07	-54.32
300.00	-55.43	-57.12	-58.70	-59.81
250.00	-77.82	-77.41	-77.32	-77.36
200.00	**********	**********	**********	**********
150.00	**********	**********	**********	**********
100.00	**********	**********	**********	**********
50.00	**********	**********	**********	**********
0.0	**********	**********	**********	**********
-50.00	**********	**********	**********	**********
-100.00	**********	**********	**********	**********
-150.00	**********	**********	**********	**********
-200.00	**********	**********	**********	**********
-250.00	-119.06	-120.88	-122.39	-123.38
-300.00	-87.34	-91.26	-94.39	-96.39
-350.00	-67.64	-73.62	-78.27	-81.20
-400.00	-57.06	-64.08	-69.36	-72.60
-450.00	-49.74	-55.93	-60.26	-62.77
-500.00	-40.52	-43.88	-45.57	-46.20
-550.00	-28.77	-28.28	-26.39	-24.44
-600.00	-19.65	-16.27	-11.37	-7.13
-650.00	-19.85	-16.49	-10.74	-5.46
-700.00	-26.66	-26.15	-21.72	-16.78
-750.00	-16.71	-17.76	-14.13	-9.44
-800.00	**********	**********	**********	**********

A129

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
 &NAM D=20.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=1,NET=30,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,
-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4
-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.3,-1.9,-3.0,-5.0,-5.0,-3.0,-1.9,-1.3,-0.8,-0.5,-0.2,-0.1, 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,
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ORIGINAL PAGE IS
OF POOR QUALITY

A130


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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:      10.000000

WAVELENGTH:                                 0.5320E-04

GLADSTONE-DALE CONSTANT:                    0.2270E-03

TOLERANCE PARAMETER:                        0.1000E-03

NUMBER OF PROJECTIONS:                     18

TOTAL NUMBER OF SAMPLING POINTS:         324

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:          12          12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

     1      0.0        18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.5 -0.8 -1.3 -1.9 -3.0 -5.0 -5.0 -3.0 -1.9 -1.3 -0.8 -0.5 -0.2 -0.1  0.0

     2     10.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.2 -1.9 -3.0 -8.0 -5.5 -2.6 -1.6 -0.9 -0.5 -0.3 -0.1 -0.1  0.0

     3     20.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.4 -0.8 -1.3 -1.9 -2.7 -4.1 -8.0 -6.0 -3.8 -2.7 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

     4     30.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.3 -0.5 -0.9 -1.6 -2.8 -7.0 -3.6 -2.0 -1.1 -0.6 -0.3 -0.2 -0.1 -0.1  0.0

     5     40.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.5 -0.9 -1.4 -2.0 -2.9 -4.1 -9.0 -6.0 -3.6 -2.4 -1.7 -1.1 -0.7 -0.4 -0.2  0.0

     6     50.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.4 -0.8 -1.3 -1.8 -2.5 -3.7 -7.0 -4.0 -2.1 -1.3 -0.9 -0.6 -0.3 -0.2 -0.1  0.0

     7     60.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.5 -0.8 -1.2 -1.8 -3.0 -5.5 -4.0 -2.8 -2.0 -1.5 -1.0 -0.6 -0.3 -0.1  0.0

     8     70.00       18          -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.6 -1.0 -1.6 -2.2 -3.0 -4.2 -7.0 -4.2 -3.4 -2.8 -2.2 -1.7 -1.1 -0.6 -0.2  0.0
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      9      80.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0 -0.1 -0.3 -0.7 -1.5 -2.8 -4.8 -3.7 -2.7 -2.0 -1.4 -1.0 -0.6 -0.3 -0.1  0.0

     10      90.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.2 -2.1 -3.4 -5.0 -3.5 -2.5 -1.7 -1.2 -0.8 -0.5 -0.3 -0.2  0.0

     11     100.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0 -0.1 -0.3 -0.7 -1.5 -2.8 -4.8 -3.7 -2.7 -2.0 -1.4 -1.0 -0.6 -0.3 -0.1  0.0

     12     110.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.6 -1.0 -1.6 -2.2 -3.0 -4.2 -7.0 -4.2 -3.4 -2.8 -2.2 -1.7 -1.1 -0.6 -0.2  0.0

     13     120.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.5 -0.8 -1.2 -1.8 -3.0 -5.5 -4.0 -2.8 -2.0 -1.5 -1.0 -0.6 -0.3 -0.1  0.0

     14     130.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.4 -0.8 -1.3 -1.8 -2.5 -3.7 -7.0 -4.0 -2.1 -1.3 -0.9 -0.6 -0.3 -0.2 -0.1  0.0

     15     140.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.5 -0.9 -1.4 -2.0 -2.9 -4.1 -9.0 -6.0 -3.6 -2.4 -1.7 -1.1 -0.7 -0.4 -0.2  0.0

     16     150.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.3 -0.5 -0.9 -1.6 -2.8 -7.0 -3.6 -2.0 -1.1 -0.6 -0.3 -0.2 -0.1 -0.1  0.0

     17     160.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.4 -0.8 -1.3 -1.9 -2.7 -4.1 -8.0 -6.0 -3.8 -2.7 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

     18     170.00          18               -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.2 -1.9 -3.0 -8.0 -5.5 -2.6 -1.6 -0.9 -0.5 -0.3 -0.1 -0.1  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:     0.2526E+00

X AND Y COORDINATES MULTIPLIED BY:       0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:       0.100E+04

Y \ X:-100 -93 -86 -79 -72 -66 -59 -52 -45 -38 -31 -24 -17 -10  -3   3  10  17  24  31  38  45  52  59  66  72  79  86  93 100

   100    ************************************************************************************************************************
    93    ************************************************************   0   0   0 -13 -19 -15  -4   0   0   0****************************
    86    ****************************************************   0   0 -16 -25 -29 -30 -27 -22 -14  -7   0   0   0   0********************
    79    ********************************************   0  -2 -24 -27 -22 -17 -13 -11  -9  -7  -4  -1   0  -1  -2  -2   0   0************
    72    ****************************************   0 -17 -31 -25 -15  -7  -4  -4  -4  -5  -5  -5  -5  -5  -6  -6  -6  -4   0   0********
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A131

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  66 ****************    0 -21 -31 -21 -11  -7  -7  -9 -11 -13 -13 -13 -13 -14 -15 -15 -14 -11  -6  -2   0   0****************
  59 ************   0 -20 -33 -20 -10  -9 -14 -19 -23 -24 -24 -22 -20 -18 -18 -19 -21 -21 -18 -11  -5  -2  -1   0************
  52 ************  -7 -35 -23 -11 -11 -20 -29 -33 -34 -33 -30 -26 -22 -17 -14 -14 -17 -20 -21 -16  -9  -4  -7  -7************
  45 ********   0 -32 -29 -12 -11 -21 -34 -40 -41 -39 -38 -36 -34 -28 -20 -13  -8  -9 -13 -18 -18 -12  -6  -7 -15  -4********
  38 ********  -6 -34 -17  -8 -18 -33 -43 -45 -42 -42 -46 -53 -57 -54 -44 -28 -14  -7  -9 -15 -19 -17  -9  -6 -13 -16********
  31 ****   0 -23 -26  -8 -10 -26 -42 -46 -43 -42 -50 -67 -89-105-109 -96 -71 -44 -23 -15 -18 -23 -23 -14  -6 -10 -19   0****
  24 ****   0 -28 -17  -4 -14 -34 -46 -45 -41 -45 -66-103-145-177-188-174-139 -95 -58 -36 -29 -32 -32 -23 -11  -9 -19  -9****
  17 ****   0 -29 -11  -3 -19 -39 -47 -42 -39 -52 -89-147****************-219-159-104 -66 -48 -45 -43 -33 -18 -11 -20 -19****
  10 ****  -2 -28  -7  -4 -23 -42 -46 -40 -39 -60-112************************-218-147 -95 -68 -59 -54 -43 -25 -15 -22 -26****
   3 ****  -8 -28  -6  -5 -25 -43 -46 -38 -39 -66-126************************-252-174-114 -80 -67 -61 -49 -30 -17 -24 -30****
  -3 ****  -8 -27  -6  -4 -25 -43 -46 -39 -39 -66-127************************-253-174-114 -80 -67 -61 -49 -29 -17 -23 -30****
 -10 ****  -1 -27  -6  -3 -22 -41 -46 -40 -39 -61-113************************-218-148 -96 -68 -59 -54 -43 -25 -14 -21 -25****
 -17 ****   0 -27  -9  -2 -18 -38 -47 -43 -39 -53 -90-148****************-220-161-105 -66 -49 -45 -43 -33 -17 -10 -19 -18****
 -24 ****   0 -26 -15  -2 -13 -33 -45 -45 -41 -46 -67-104-146-179-190-176-140 -97 -59 -36 -30 -32 -31 -22  -9  -7 -17  -8****
 -31 ****   0 -20 -23  -6  -8 -25 -41 -46 -44 -43 -51 -69 -91-107-110 -97 -72 -45 -24 -15 -17 -22 -21 -12  -4  -7 -16   0****
 -38 ********  -3 -30 -14  -6 -15 -32 -42 -44 -43 -43 -48 -54 -59 -56 -45 -30 -15  -8  -9 -14 -18 -14  -6  -2 -10 -13********
 -45 ********   0 -29 -25  -9  -8 -19 -32 -39 -41 -40 -38 -37 -35 -29 -21 -13  -8  -8 -12 -17 -16  -9  -2  -3 -11  -1********
 -52 ************  -3 -31 -18  -7  -8 -17 -27 -32 -34 -33 -30 -26 -22 -17 -14 -13 -16 -18 -18 -13  -5   0  -3  -3************
 -59 ************   0 -15 -27 -15  -6  -5 -11 -17 -21 -23 -22 -21 -19 -17 -16 -17 -18 -18 -14  -7   0   0   0   0************
 -66 ****************   0 -15 -25 -16  -6  -2  -2  -5  -8 -10 -10 -11 -10 -11 -11 -11 -10  -6  -1   0   0   0****************
 -72 ********************   0 -11 -25 -19  -9  -2   0   0   0   0   0   0   0   0   0   0   0   0   0   0********************
 -79 ************************   0   0 -18 -20 -15 -10  -7  -5  -3   0   0   0   0   0   0   0   0   0************************
 -86 ****************************   0   0  -9 -18 -21 -22 -20 -14  -7   0   0   0   0   0****************************
 -93 ********************************   0   0   0  -6 -11  -7   0   0   0   0********************************
-100 ************************************************************************************************************************
```

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 NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
 &NAM D=20.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=-1,NET=41,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,
-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4
-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,
 0.0,-0.1,-0.2,-0.5,-0.8,-1.3,-1.9,-3.0,-5.0,-5.0,-3.0,-1.9,-1.3,-0.8,-0.5,-0.2,-0.1, 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.2,-1.9,-3.0,
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A 134

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OF POOR QUALITY

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                         RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

                              (BY THE SERIES EXPANSION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.6 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:      10.000000

WAVELENGTH:                                 0.5320E-04

GLADSTONE-DALE CONSTANT:                    0.2270E-03

TOLERANCE PARAMETER:                        0.1000E-03

NUMBER OF PROJECTIONS:                     18

TOTAL NUMBER OF SAMPLING POINTS:         324

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:            12         12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

     1      0.0         18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.5 -0.8 -1.3 -1.9 -3.0 -5.0 -5.0 -3.0 -1.9 -1.3 -0.8 -0.5 -0.2 -0.1  0.0

     2     10.00        18            -0.2400E+01    0.2400E+01
 -1.00 0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.2 -1.9 -3.0 -8.0 -5.5 -2.6 -1.6 -0.9 -0.5 -0.3 -0.1 -0.1  0.0

     3     20.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.4 -0.8 -1.3 -1.9 -2.7 -4.1 -8.0 -6.0 -3.8 -2.7 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

     4     30.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.3 -0.5 -0.9 -1.6 -2.8 -7.0 -3.6 -2.0 -1.1 -0.6 -0.3 -0.2 -0.1 -0.1  0.0

     5     40.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.5 -0.9 -1.4 -2.0 -2.9 -4.1 -9.0 -6.0 -3.6 -2.4 -1.7 -1.1 -0.7 -0.4 -0.2  0.0

     6     50.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.4 -0.8 -1.3 -1.8 -2.5 -3.7 -7.0 -4.0 -2.1 -1.3 -0.9 -0.6 -0.3 -0.2 -0.1  0.0

     7     60.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.2 -0.5 -0.8 -1.2 -1.8 -3.0 -5.5 -4.0 -2.8 -2.0 -1.5 -1.0 -0.6 -0.3 -0.1  0.0

     8     70.00        18            -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.6 -1.0 -1.6 -2.2 -3.0 -4.2 -7.0 -4.2 -3.4 -2.8 -2.2 -1.7 -1.1 -0.6 -0.2  0.0
```

```
    9     80.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0 -0.1 -0.3 -0.7 -1.5 -2.8 -4.8 -3.7 -2.7 -2.0 -1.4 -1.0 -0.6 -0.3 -0.1  0.0

   10     90.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0 -0.1 -0.3 -0.7 -1.2 -2.1 -3.4 -5.0 -3.5 -2.5 -1.7 -1.2 -0.8 -0.5 -0.3 -0.2  0.0

   11    100.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0 -0.1 -0.3 -0.7 -1.5 -2.8 -4.8 -3.7 -2.7 -2.0 -1.4 -1.0 -0.6 -0.3 -0.1  0.0

   12    110.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.2 -0.6 -1.0 -1.6 -2.2 -3.0 -4.2 -7.0 -4.2 -3.4 -2.8 -2.2 -1.7 -1.1 -0.6 -0.2  0.0

   13    120.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.2 -0.5 -0.8 -1.2 -1.8 -3.0 -5.5 -4.0 -2.8 -2.0 -1.5 -1.0 -0.6 -0.3 -0.1  0.0

   14    130.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.2 -0.4 -0.8 -1.3 -1.8 -2.5 -3.7 -7.0 -4.0 -2.1 -1.3 -0.9 -0.6 -0.3 -0.2 -0.1  0.0

   15    140.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.2 -0.5 -0.9 -1.4 -2.0 -2.9 -4.1 -9.0 -6.0 -3.6 -2.4 -1.7 -1.1 -0.7 -0.4 -0.2  0.0

   16    150.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.2 -0.3 -0.5 -0.9 -1.6 -2.8 -7.0 -3.6 -2.0 -1.1 -0.6 -0.3 -0.2 -0.1 -0.1  0.0

   17    160.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.4 -0.8 -1.3 -1.9 -2.7 -4.1 -8.0 -6.0 -3.8 -2.7 -2.0 -1.4 -0.9 -0.5 -0.2  0.0

   18    170.00          18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0 -0.1 -0.3 -0.7 -1.2 -1.5 -3.0 -8.0 -5.5 -2.6 -1.6 -0.9 -0.5 -0.3 -0.1 -0.1  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:     0.2466E+00

THE RADIUS R IS MULTIPLIED BY:            0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:        0.100E+04
```

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	100.00	**********	5.00	100.00	**********	10.00	100.00	**********	15.00	100.00	**********
	95.00	-24.91		95.00	-22.93		95.00	-18.28		95.00	-14.62
	90.00	-30.78		90.00	-29.63		90.00	-24.55		90.00	-20.33
	85.00	-21.37		85.00	-20.03		85.00	-16.40		85.00	-12.66
	80.00	-16.98		80.00	-15.91		80.00	-12.85		80.00	-9.39
	75.00	-23.58		75.00	-22.54		75.00	-19.48		75.00	-15.66
	70.00	-37.07		70.00	-35.87		70.00	-32.35		70.00	-27.59
	65.00	-50.70		65.00	-49.27		65.00	-45.10		65.00	-39.14
	60.00	-60.14		60.00	-58.49		60.00	-53.74		60.00	-46.75
	55.00	-65.43		55.00	-63.66		55.00	-58.60		55.00	-51.01
	50.00	-70.52		50.00	-68.75		50.00	-63.72		50.00	-56.08

	20.00	25.00	30.00	35.00
45.00	-81.27	-79.62	-74.94	-67.78
40.00	-103.11	-101.66	-97.58	-91.28
35.00	-139.01	-137.80	-134.44	-129.22
30.00	-188.32	-187.37	-184.74	-180.62
25.00	-246.64	-245.92	-243.95	-240.86
20.00	**********	**********	**********	**********
15.00	**********	**********	**********	**********
10.00	**********	**********	**********	**********
5.00	**********	**********	**********	**********
0.0	**********	**********	**********	**********
-5.00	**********	**********	**********	**********
-10.00	**********	**********	**********	**********
-15.00	**********	**********	**********	**********
-20.00	**********	**********	**********	**********
-25.00	-118.99	-119.38	-120.37	-121.94
-30.00	-74.23	-74.60	-75.51	-76.95
-35.00	-47.29	-47.58	-48.31	-49.45
-40.00	-37.06	-37.26	-37.73	-38.46
-45.00	-38.49	-38.60	-38.82	-39.17
-50.00	-44.12	-44.15	-44.20	-44.28
-55.00	-46.40	-46.39	-46.39	-46.42
-60.00	-40.51	-40.48	-40.56	-40.75
-65.00	-26.59	-26.56	-26.75	-27.20
-70.00	-10.49	-10.41	-10.60	-11.22
-75.00	-1.62	-1.39	-1.33	-1.82
-80.00	-7.35	-6.81	-6.16	-6.16
-85.00	-24.00	-23.06	-21.60	-21.00
-90.00	-28.58	-27.30	-25.27	-24.72
-95.00	0.0	0.0	0.0	0.0
-100.00	**********	**********	**********	**********
100.00	**********	**********	**********	**********
95.00	-13.64	-13.33	-10.22	-3.24
90.00	-18.02	-16.52	-13.55	-8.35
85.00	-10.25	-8.94	-7.54	-5.51
80.00	-6.88	-5.65	-5.30	-5.47
75.00	-12.35	-10.30	-9.64	-10.24
70.00	-22.82	-19.05	-16.82	-16.27
65.00	-32.64	-26.73	-22.26	-19.61
60.00	-38.70	-30.81	-24.08	-19.14
55.00	-41.97	-32.69	-24.22	-17.35
50.00	-46.78	-36.92	-27.51	-19.41
45.00	-58.92	-49.27	-39.77	-31.20
40.00	-83.37	-74.59	-65.68	-57.33
35.00	-122.57	-115.03	-107.17	-99.53
30.00	-175.32	-169.18	-162.59	-155.94
25.00	-236.81	-232.02	-226.73	-221.19
20.00	**********	**********	**********	**********
15.00	**********	**********	**********	**********
10.00	**********	**********	**********	**********
5.00	**********	**********	**********	**********
0.0	**********	**********	**********	**********
-5.00	**********	**********	**********	**********
-10.00	**********	**********	**********	**********
-15.00	**********	**********	**********	**********
-20.00	**********	**********	**********	**********
-25.00	-124.08	-126.73	-129.85	-133.38
-30.00	-78.90	-81.33	-84.18	-87.39
-35.00	-50.99	-52.90	-55.15	-57.68
-40.00	-39.46	-40.70	-42.15	-43.76
-45.00	-39.63	-40.21	-40.87	-41.55

ORIGINAL PAGE IS OF POOR QUALITY

	-50.00	-44.40		-50.00	-44.51		-50.00	-44.58		-50.00	-44.55
	-55.00	-46.46		-55.00	-46.46		-55.00	-46.32		-55.00	-45.95
	-60.00	-41.01		-60.00	-41.25		-60.00	-41.32		-60.00	-41.04
	-65.00	-27.87		-65.00	-28.61		-65.00	-29.17		-65.00	-29.30
	-70.00	-12.27		-70.00	-13.52		-70.00	-14.59		-70.00	-15.15
	-75.00	-2.98		-75.00	-4.50		-75.00	-5.79		-75.00	-6.45
	-80.00	-7.14		-80.00	-8.64		-80.00	-9.76		-80.00	-9.95
	-85.00	-21.93		-85.00	-23.59		-85.00	-24.50		-85.00	-23.87
	-90.00	-26.66		-90.00	-29.70		-90.00	-31.38		-90.00	-30.45
	-95.00	0.0		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
40.00	100.00	**********	45.00	100.00	**********	50.00	100.00	**********	55.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	-2.90		90.00	-0.11		90.00	-0.88		90.00	-3.00
	85.00	-3.70		85.00	-3.39		85.00	-4.66		85.00	-5.92
	80.00	-6.26		80.00	-7.81		80.00	-9.59		80.00	-10.34
	75.00	-11.86		75.00	-14.08		75.00	-16.05		75.00	-16.68
	70.00	-17.15		70.00	-18.89		70.00	-20.61		70.00	-21.34
	65.00	-18.75		65.00	-19.22		65.00	-20.28		65.00	-21.10
	60.00	-16.19		60.00	-15.03		60.00	-15.13		60.00	-15.86
	55.00	-12.50		55.00	-9.70		55.00	-8.69		55.00	-9.01
	50.00	-13.15		50.00	-8.97		50.00	-6.81		50.00	-6.40
	45.00	-24.15		45.00	-18.97		45.00	-15.73		45.00	-14.33
	40.00	-50.08		40.00	-44.30		40.00	-40.16		40.00	-37.66
	35.00	-92.55		35.00	-86.56		35.00	-81.77		35.00	-78.22
	30.00	-149.55		30.00	-143.70		30.00	-138.55		30.00	-134.20
	25.00	-215.61		25.00	-210.19		25.00	-205.05		25.00	-200.29
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-137.24		-25.00	-141.36		-25.00	-145.64		-25.00	-150.00
	-30.00	-90.88		-30.00	-94.56		-30.00	-98.32		-30.00	-102.06
	-35.00	-60.39		-35.00	-63.21		-35.00	-66.02		-35.00	-68.72
	-40.00	-45.46		-40.00	-47.16		-40.00	-48.76		-40.00	-50.16
	-45.00	-42.19		-45.00	-42.72		-45.00	-43.05		-45.00	-43.10
	-50.00	-44.33		-50.00	-43.86		-50.00	-43.08		-50.00	-41.95
	-55.00	-45.25		-55.00	-44.15		-55.00	-42.61		-55.00	-40.64
	-60.00	-40.30		-60.00	-39.01		-60.00	-37.17		-60.00	-34.82
	-65.00	-28.85		-65.00	-27.76		-65.00	-26.04		-65.00	-23.77
	-70.00	-15.06		-70.00	-14.33		-70.00	-13.00		-70.00	-11.13
	-75.00	-6.42		-75.00	-5.88		-75.00	-4.96		-75.00	-3.64
	-80.00	-9.38		-80.00	-8.60		-80.00	-7.86		-80.00	-6.95
	-85.00	-22.22		-85.00	-20.71		-85.00	-19.83		-85.00	-19.00
	-90.00	-27.88		-90.00	-25.63		-90.00	-24.49		-90.00	-23.42
	-95.00	0.0		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
60.00	100.00	**********	65.00	100.00	**********	70.00	100.00	**********	75.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	-3.23		90.00	-0.70		90.00	0.0		90.00	-0.09
	85.00	-5.28		85.00	-2.62		85.00	-0.22		85.00	-1.14
	80.00	-8.96		80.00	-5.65		80.00	-2.13		80.00	-0.61
	75.00	-15.22		75.00	-11.86		75.00	-7.81		75.00	-4.62
	70.00	-20.44		70.00	-17.95		70.00	-14.59		70.00	-11.38
	65.00	-21.09		65.00	-20.09		65.00	-18.41		65.00	-16.61

A128

ORIGINAL PAGE IS
OF POOR QUALITY

80.00		85.00		90.00		95.00	
60.00	-16.65	60.00	-17.21	60.00	-17.51	60.00	-17.75
55.00	-10.19	55.00	-11.84	55.00	-13.75	55.00	-15.80
50.00	-7.37	50.00	-9.34	50.00	-11.98	50.00	-15.02
45.00	-14.52	45.00	-15.97	45.00	-18.32	45.00	-21.25
40.00	-36.65	40.00	-36.89	40.00	-38.08	40.00	-39.91
35.00	-75.86	35.00	-74.55	35.00	-74.06	35.00	-74.14
30.00	-130.65	30.00	-127.81	30.00	-125.56	30.00	-123.75
25.00	-195.93	25.00	-191.95	25.00	-188.31	25.00	-184.93
20.00	**********	20.00	**********	20.00	**********	20.00	**********
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	**********	-20.00	**********	-20.00	**********	-20.00	**********
-25.00	-154.35	-25.00	-158.62	-25.00	-162.74	-25.00	-166.67
-30.00	-105.68	-30.00	-109.08	-30.00	-112.19	-30.00	-114.96
-35.00	-71.19	-35.00	-73.33	-35.00	-75.06	-35.00	-76.33
-40.00	-51.25	-40.00	-51.95	-40.00	-52.18	-40.00	-51.90
-45.00	-42.80	-45.00	-42.10	-45.00	-40.97	-45.00	-39.38
-50.00	-40.46	-50.00	-38.61	-50.00	-36.45	-50.00	-34.00
-55.00	-38.31	-55.00	-35.72	-55.00	-32.98	-55.00	-30.21
-60.00	-32.11	-60.00	-29.22	-60.00	-26.39	-60.00	-23.82
-65.00	-21.11	-65.00	-18.37	-65.00	-15.87	-65.00	-13.88
-70.00	-8.88	-70.00	-6.59	-70.00	-4.68	-70.00	-3.47
-75.00	-1.92	-75.00	-0.15	-75.00	0.0	-75.00	0.0
-80.00	-5.59	-80.00	-4.08	-80.00	-3.20	-80.00	-3.49
-85.00	-17.49	-85.00	-15.56	-85.00	-14.54	-85.00	-15.41
-90.00	-21.01	-90.00	-17.65	-90.00	-15.63	-90.00	-16.99
-95.00	0.0	-95.00	0.0	-95.00	0.0	-95.00	0.0
-100.00	**********	-100.00	**********	-100.00	**********	-100.00	**********
100.00	**********	100.00	**********	100.00	**********	100.00	**********
95.00	0.0	95.00	0.0	95.00	-3.45	95.00	-2.38
90.00	-8.02	90.00	-19.19	90.00	-28.17	90.00	-31.11
85.00	-6.64	85.00	-14.84	85.00	-22.01	85.00	-25.30
80.00	-2.12	80.00	-5.78	80.00	-9.35	80.00	-11.12
75.00	-3.20	75.00	-3.33	75.00	-4.00	75.00	-4.27
70.00	-9.06	70.00	-7.78	70.00	-7.20	70.00	-6.95
65.00	-15.18	65.00	-14.36	65.00	-14.14	65.00	-14.42
60.00	-18.13	60.00	-18.83	60.00	-19.89	60.00	-21.32
55.00	-17.99	55.00	-20.31	55.00	-22.76	55.00	-25.31
50.00	-18.27	50.00	-21.57	50.00	-24.83	50.00	-27.96
45.00	-24.48	45.00	-27.76	45.00	-30.90	45.00	-33.77
40.00	-42.08	40.00	-44.32	40.00	-46.42	40.00	-48.20
35.00	-74.56	35.00	-75.06	35.00	-75.45	35.00	-75.56
30.00	-122.20	30.00	-120.73	30.00	-119.19	30.00	-117.45
25.00	-181.70	25.00	-178.52	25.00	-175.31	25.00	-171.99
20.00	**********	20.00	**********	20.00	**********	20.00	**********
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	**********	-20.00	**********	-20.00	**********	-20.00	**********
-25.00	-170.39	-25.00	-173.89	-25.00	-177.22	-25.00	-180.42
-30.00	-117.36	-30.00	-119.40	-30.00	-121.15	-30.00	-122.68

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ORIGINAL PAGE IS
OF POOR QUALITY

	-35.00	-77.10		-35.00	-77.40		-35.00	-77.30		-35.00	-76.90
	-40.00	-51.08		-40.00	-49.75		-40.00	-47.98		-40.00	-45.88
	-45.00	-37.33		-45.00	-34.84		-45.00	-31.98		-45.00	-28.83
	-50.00	-31.29		-50.00	-28.35		-50.00	-25.23		-50.00	-21.97
	-55.00	-27.48		-55.00	-24.83		-55.00	-22.28		-55.00	-19.84
	-60.00	-21.62		-60.00	-19.80		-60.00	-18.37		-60.00	-17.32
	-65.00	-12.51		-65.00	-11.72		-65.00	-11.42		-65.00	-11.65
	-70.00	-2.98		-70.00	-2.96		-70.00	-3.20		-70.00	-3.80
	-75.00	0.0		-75.00	0.0		-75.00	0.0		-75.00	0.0
	-80.00	-4.44		-80.00	-4.63		-80.00	-2.83		-80.00	0.0
	-85.00	-17.37		-85.00	-17.88		-85.00	-14.56		-85.00	-7.42
	-90.00	-20.87		-90.00	-23.34		-90.00	-20.37		-90.00	-11.42
	-95.00	0.0		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
100.00	100.00	**********	105.00	100.00	**********	110.00	100.00	**********	115.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	-28.55		90.00	-24.53		90.00	-22.96		90.00	-24.72
	85.00	-24.71		85.00	-22.60		85.00	-21.54		85.00	-22.31
	80.00	-10.86		80.00	-9.78		80.00	-9.33		80.00	-9.98
	75.00	-3.95		75.00	-3.59		75.00	-3.86		75.00	-4.96
	70.00	-6.92		70.00	-7.33		70.00	-8.43		70.00	-10.21
	65.00	-15.18		65.00	-16.50		65.00	-18.42		65.00	-20.82
	60.00	-23.12		60.00	-25.29		60.00	-27.82		60.00	-30.60
	55.00	-27.95		55.00	-30.67		55.00	-33.43		55.00	-36.15
	50.00	-30.90		50.00	-33.61		50.00	-36.08		50.00	-38.25
	45.00	-36.27		45.00	-38.34		45.00	-39.96		45.00	-41.13
	40.00	-49.54		40.00	-50.39		40.00	-50.71		40.00	-50.53
	35.00	-75.28		35.00	-74.54		35.00	-73.32		35.00	-71.66
	30.00	-115.43		30.00	-113.06		30.00	-110.35		30.00	-107.30
	25.00	-168.51		25.00	-164.83		25.00	-160.95		25.00	-156.89
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-183.57		-25.00	-186.77		-25.00	-190.11		-25.00	-193.68
	-30.00	-124.13		-30.00	-125.65		-30.00	-127.41		-30.00	-129.59
	-35.00	-76.38		-35.00	-75.93		-35.00	-75.80		-35.00	-76.23
	-40.00	-43.61		-40.00	-41.41		-40.00	-39.54		-40.00	-38.30
	-45.00	-25.54		-45.00	-22.29		-45.00	-19.33		-45.00	-16.94
	-50.00	-18.65		-50.00	-15.40		-50.00	-12.35		-50.00	-9.70
	-55.00	-17.52		-55.00	-15.34		-55.00	-13.30		-55.00	-11.41
	-60.00	-16.63		-60.00	-16.28		-60.00	-16.08		-60.00	-15.83
	-65.00	-12.51		-65.00	-13.99		-65.00	-15.86		-65.00	-17.64
	-70.00	-5.12		-70.00	-7.52		-70.00	-10.83		-70.00	-14.32
	-75.00	0.0		-75.00	0.0		-75.00	-2.83		-75.00	-7.05
	-80.00	0.0		-80.00	0.0		-80.00	0.0		-80.00	0.0
	-85.00	0.0		-85.00	0.0		-85.00	0.0		-85.00	0.0
	-90.00	-0.34		-90.00	0.0		-90.00	0.0		-90.00	0.0
	-95.00	0.0		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
120.00	100.00	**********	125.00	100.00	**********	130.00	100.00	**********	135.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	-0.22		95.00	-0.68
	90.00	-27.77		90.00	-29.81		90.00	-30.47		90.00	-31.14
	85.00	-23.94		85.00	-25.10		85.00	-25.53		85.00	-25.98
	80.00	-11.23		80.00	-12.28		80.00	-12.85		80.00	-13.21

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ORIGINAL PAGE IS
OF POOR QUALITY

	140.00	145.00	150.00	155.00
75.00	-6.52	-7.98	-9.03	-9.63
70.00	-12.35	-14.41	-16.06	-17.15
65.00	-23.46	-25.99	-28.12	-29.68
60.00	-33.42	-36.07	-38.34	-40.09
55.00	-38.73	-41.03	-42.97	-44.48
50.00	-40.11	-41.63	-42.78	-43.58
45.00	-41.87	-42.22	-42.22	-41.96
40.00	-49.90	-48.88	-47.56	-46.06
35.00	-69.59	-67.20	-64.61	-61.90
30.00	-103.98	-100.45	-96.81	-93.17
25.00	-152.70	-148.44	-144.18	-140.01
20.00	**********	**********	**********	**********
15.00	**********	**********	**********	**********
10.00	**********	**********	**********	**********
5.00	**********	**********	**********	**********
0.0	**********	**********	**********	**********
-5.00	**********	**********	**********	**********
-10.00	**********	**********	**********	**********
-15.00	**********	**********	**********	**********
-20.00	**********	**********	**********	**********
-25.00	-197.58	-201.85	-206.51	-211.54
-30.00	-132.34	-135.81	-140.06	-145.09
-35.00	-77.47	-79.74	-83.18	-87.87
-40.00	-38.00	-38.94	-41.35	-45.40
-45.00	-15.45	-15.22	-16.56	-19.73
-50.00	-7.71	-6.72	-7.11	-9.25
-55.00	-9.78	-8.62	-8.32	-9.37
-60.00	-15.33	-14.61	-13.97	-13.95
-65.00	-18.74	-18.88	-18.20	-17.31
-70.00	-16.97	-18.06	-17.54	-16.06
-75.00	-10.63	-12.34	-11.99	-10.33
-80.00	-3.32	-5.00	-4.60	-3.20
-85.00	0.0	0.0	0.0	0.0
-90.00	0.0	0.0	0.0	0.0
-95.00	0.0	0.0	0.0	0.0
-100.00	**********	**********	**********	**********
100.00	**********	**********	**********	**********
95.00	-2.21	-3.77	-2.73	0.0
90.00	-32.89	-34.92	-35.28	-33.00
85.00	-27.01	-28.14	-28.23	-26.74
80.00	-13.57	-13.69	-13.02	-11.40
75.00	-9.83	-9.49	-8.44	-6.74
70.00	-17.63	-17.44	-16.59	-15.21
65.00	-30.60	-30.86	-30.53	-29.76
60.00	-41.28	-41.92	-42.08	-41.90
55.00	-45.55	-46.22	-46.55	-46.66
50.00	-44.08	-44.32	-44.38	-44.34
45.00	-41.50	-40.93	-40.33	-39.76
40.00	-44.46	-42.87	-41.37	-40.04
35.00	-59.20	-56.61	-54.23	-52.12
30.00	-89.62	-86.27	-83.20	-80.50
25.00	-136.02	-132.29	-128.90	-125.92
20.00	**********	**********	**********	**********
15.00	**********	**********	**********	**********
10.00	**********	**********	**********	**********
5.00	**********	**********	**********	**********
0.0	**********	**********	**********	**********
-5.00	**********	**********	**********	**********
-10.00	**********	**********	**********	**********
-15.00	**********	**********	**********	**********

ORIGINAL PAGE IS
OF POOR QUALITY

	-20.00	**********
	-25.00	-216.84
	-30.00	-150.81
	-35.00	-93.74
	-40.00	-51.08
	-45.00	-24.85
	-50.00	-13.41
	-55.00	-12.20
	-60.00	-15.22
	-65.00	-17.01
	-70.00	-14.58
	-75.00	-8.45
	-80.00	-2.07
	-85.00	0.0
	-90.00	0.0
	-95.00	0.0
	-100.00	**********
160.00	100.00	**********
	95.00	0.0
	90.00	-29.32
	85.00	-24.47
	80.00	-9.37
	75.00	-4.80
	70.00	-13.64
	65.00	-28.80
	60.00	-41.53
	55.00	-46.63
	50.00	-44.26
	45.00	-39.27
	40.00	-38.93
	35.00	-50.35
	30.00	-78.23
	25.00	-123.42
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-237.46
	-30.00	-175.99
	-35.00	-123.20
	-40.00	-83.91
	-45.00	-59.28
	-50.00	-46.92
	-55.00	-41.81
	-60.00	-38.18
	-65.00	-31.71
	-70.00	-21.45
	-75.00	-10.54
	-80.00	-4.65
	-85.00	-7.70
	-90.00	-15.35
	-95.00	-11.27
	-100.00	**********

	-20.00	**********
	-25.00	-222.28
	-30.00	-157.06
	-35.00	-100.59
	-40.00	-58.22
	-45.00	-31.82
	-50.00	-19.64
	-55.00	-17.08
	-60.00	-18.27
	-65.00	-18.06
	-70.00	-13.97
	-75.00	-7.19
	-80.00	-1.73
	-85.00	-1.23
	-90.00	-3.88
	-95.00	0.0
	-100.00	**********
165.00	100.00	**********
	95.00	0.0
	90.00	-26.74
	85.00	-22.93
	80.00	-7.84
	75.00	-3.20
	70.00	-12.26
	65.00	-27.90
	60.00	-41.14
	55.00	-46.55
	50.00	-44.18
	45.00	-38.89
	40.00	-38.06
	35.00	-48.97
	30.00	-76.44
	25.00	-121.45
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-241.35
	-30.00	-181.13
	-35.00	-129.70
	-40.00	-91.68
	-45.00	-68.06
	-50.00	-56.18
	-55.00	-50.88
	-60.00	-46.36
	-65.00	-38.44
	-70.00	-26.55
	-75.00	-14.28
	-80.00	-7.71
	-85.00	-10.73
	-90.00	-18.31
	-95.00	-12.83
	-100.00	**********

	-20.00	**********
	-25.00	-227.68
	-30.00	-163.57
	-35.00	-108.10
	-40.00	-66.46
	-45.00	-40.31
	-50.00	-27.71
	-55.00	-23.98
	-60.00	-23.32
	-65.00	-20.90
	-70.00	-14.82
	-75.00	-6.98
	-80.00	-2.04
	-85.00	-3.81
	-90.00	-9.65
	-95.00	-6.76
	-100.00	**********
170.00	100.00	**********
	95.00	0.0
	90.00	-26.62
	85.00	-22.89
	80.00	-7.29
	75.00	-2.25
	70.00	-11.30
	65.00	-27.22
	60.00	-40.83
	55.00	-46.48
	50.00	-44.13
	45.00	-38.63
	40.00	-37.46
	35.00	-47.98
	30.00	-75.17
	25.00	-120.04
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-244.28
	-30.00	-185.08
	-35.00	-134.76
	-40.00	-97.85
	-45.00	-75.13
	-50.00	-63.79
	-55.00	-58.51
	-60.00	-53.47
	-65.00	-44.63
	-70.00	-31.66
	-75.00	-18.55
	-80.00	-11.72
	-85.00	-15.11
	-90.00	-23.19
	-95.00	-17.08
	-100.00	**********

	-20.00	**********
	-25.00	-232.82
	-30.00	-170.00
	-35.00	-115.82
	-40.00	-75.25
	-45.00	-49.73
	-50.00	-37.09
	-55.00	-32.49
	-60.00	-30.17
	-65.00	-25.59
	-70.00	-17.36
	-75.00	-8.06
	-80.00	-2.90
	-85.00	-5.79
	-90.00	-13.23
	-95.00	-10.41
	-100.00	**********
175.00	100.00	**********
	95.00	0.0
	90.00	-27.98
	85.00	-23.71
	80.00	-7.38
	75.00	-1.85
	70.00	-10.76
	65.00	-26.80
	60.00	-40.62
	55.00	-46.43
	50.00	-44.11
	45.00	-38.50
	40.00	-37.12
	35.00	-47.42
	30.00	-74.42
	25.00	-119.21
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-246.08
	-30.00	-187.54
	-35.00	-137.96
	-40.00	-101.79
	-45.00	-79.71
	-50.00	-68.79
	-55.00	-63.62
	-60.00	-58.36
	-65.00	-49.03
	-70.00	-35.53
	-75.00	-22.07
	-80.00	-15.34
	-85.00	-19.38
	-90.00	-28.35
	-95.00	-22.33
	-100.00	**********

A142

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NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
&NAM D=20.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=1,NET=30,NET2=36 &END
0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,
-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.
-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.
 0.0,-0.6,-1.4,-2.2,-3.0,-4.0,-5.3,-7.1,-13.0,-13.0,-7.1,-5.3,-4.0,-3.0,-2.2,-1.4,-0.6, 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4
End of file
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                         RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

                              (BY THE SERIES EXPANSION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:      10.000000

WAVELENGTH:                                 0.5320E-04

GLADSTONE-DALE CONSTANT:                    0.2270E-03

TOLERANCE PARAMETER:                        0.1000E-03

NUMBER OF PROJECTIONS:                     18

TOTAL NUMBER OF SAMPLING POINTS:         324

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:             12         12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

      1      0.0        18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.6 -1.4 -2.2 -3.0 -4.0 -5.3 -7.1-13.0-13.0 -7.1 -5.3 -4.0 -3.0 -2.2 -1.4 -0.6  0.0

      2     10.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0

      3     20.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0

      4     30.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0

      5     40.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0

      6     50.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0

      7     60.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0

      8     70.00       18           -0.2400E+01    0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
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     9      80.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0

    10      90.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.4 -0.9 -1.6 -2.4 -3.4 -4.7 -6.5-13.0-12.0 -5.6 -3.6 -2.4 -1.6 -1.0 -0.6 -0.3  0.0

    11     100.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0

    12     110.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0

    13     120.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0

    14     130.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0

    15     140.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0

    16     150.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0

    17     160.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0

    18     170.00         18             -0.2400E+01   0.2400E+01
 -1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
  0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:     0.4393E+00

X AND Y COORDINATES MULTIPLIED BY:      0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:      0.100E+04

Y \ X:-100 -93 -86 -79 -72 -66 -59 -52 -45 -38 -31 -24 -17 -10  -3   3  10  17  24  31  38  45  52  59  66  72  79  86  93 100

  100  ************************************************************************************************************************

   93  ****************************************   0   0 -15 -48 -60 -52 -27   0   0   0*******************************************

   86  ********************************   0   0 -19 -45 -60 -69 -73 -73 -68 -60 -48 -26   0   0********************************

   79  ************************   0   0 -17 -24 -16 -11 -14 -20 -26 -28 -27 -25 -26 -32 -36 -27   0   0************************

   72  ********************   0  -8 -42 -27  -3   0   0  -4 -18 -27 -28 -21 -11  -2   0  -7 -20 -28  -6   0********************
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  66 ****************    0 -20 -53 -33  -8   0  -1 -17 -36 -53 -62 -60 -49 -33 -16  -1   0   0  -6 -22 -16   0****************
  59 ************    0  -7 -50 -34 -13  -6 -13 -29 -48 -66 -80 -85 -82 -70 -54 -38 -24 -11   0   0  -5 -28 -28   0************
  52 ************    0 -42 -29 -10  -9 -20 -32 -45 -57 -69 -79 -83 -78 -67 -54 -44 -38 -34 -25 -12  -4 -19 -49 -36************
  45 ********    0 -34 -30  -5  -3 -19 -33 -39 -42 -48 -60 -73 -80 -76 -62 -45 -36 -37 -45 -48 -39 -22 -18 -44 -73  -5********
  38 ********   -6 -45 -11   0 -13 -33 -41 -37 -35 -47 -73-102-120-117 -94 -63 -38 -32 -43 -58 -60 -44 -25 -35 -73 -56********
  31 ****    0 -52 -39  -1  -5 -32 -50 -49 -41 -48 -82-139-198-235-234-195-135 -77 -44 -41 -57 -68 -58 -33 -26 -56 -70   0****
  24 ****    0 -69 -31  -4 -24 -56 -69 -63 -61 -91-162-263-361-422-423-363-264-160 -84 -51 -53 -65 -61 -35 -16 -33 -58   0****
  17 **** -10 -73 -28 -14 -46 -80 -90 -85 -97-157-271-419****************-425-270-145 -73 -54 -59 -56 -31  -4 -10 -36   0****
  10 **** -30 -72 -28 -26 -65-100-108-107-135-223-376************************-375-207-100 -58 -53 -49 -24   0   0 -15   0****
   3 **** -38 -70 -29 -33 -76-111-119-121-159-265-439************************-439-245-118 -61 -50 -44 -20   0   0  -2   0****
  -3 **** -38 -70 -28 -33 -76-111-119-121-159-264-439************************-439-245-118 -61 -50 -44 -19   0   0  -2   0****
 -10 **** -30 -71 -27 -25 -64 -99-107-106-134-222-375************************-374-206 -99 -57 -52 -48 -24   0   0 -14   0****
 -17 **** -10 -72 -27 -14 -45 -79 -89 -83 -95-155-270-417****************-423-269-143 -72 -52 -57 -55 -30  -3  -9 -35   0****
 -24 ****    0 -69 -30  -3 -22 -54 -68 -61 -59 -88-160-260-358-419-420-360-261-157 -81 -49 -51 -63 -59 -34 -15 -32 -57   0****
 -31 ****    0 -51 -38   0  -3 -30 -48 -46 -38 -45 -79-136-195-231-231-192-131 -74 -41 -38 -54 -65 -56 -32 -25 -55 -69   0****
 -38 ********   -6 -44  -9   0 -10 -31 -38 -34 -32 -44 -70 -99-116-114 -91 -59 -35 -29 -40 -55 -57 -41 -24 -33 -72 -55********
 -45 ********    0 -33 -28  -3  -1 -16 -30 -35 -38 -44 -56 -69 -76 -71 -58 -41 -32 -33 -41 -45 -36 -20 -16 -43 -72  -4********
 -52 ************    0 -40 -27  -8  -6 -16 -29 -41 -53 -65 -75 -78 -74 -62 -49 -40 -35 -30 -22  -9  -2 -17 -48 -35************
 -59 ************    0  -6 -48 -31 -10  -3 -10 -25 -43 -62 -75 -81 -77 -66 -50 -34 -20  -7   0   0  -3 -26 -27   0************
 -66 ****************    0 -19 -51 -31  -5   0   0 -13 -32 -49 -58 -56 -45 -29 -12   0   0   0  -4 -20 -14   0****************
 -72 ********************    0  -7 -40 -25   0   0   0  -1 -14 -23 -24 -17  -7   0   0  -4 -17 -25  -5   0********************
 -79 ************************    0   0 -15 -22 -13  -8 -10 -17 -22 -24 -23 -21 -23 -29 -34 -25   0   0************************
 -86 ********************************    0   0 -17 -42 -57 -66 -70 -70 -65 -57 -45 -24   0   0********************************
 -93 ****************************************    0   0 -14 -46 -58 -50 -25   0   0   0****************************************
-100 ************************************************************************************************************************
```

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     NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )
     &NAM D=20.,WL=5.32E-5,GDC=2.27E-4,MSGNV=0,EPSL=10.E-5,NN=18,N=12,M=12,MPLOT=-1,NET=41,NET2=36 &END
    0.,10.,20.,30.,40.,50.,60.,70.,80.,90.,100.,110.,120.,130.,140.,150.,160.,170.
    18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,18,
    -2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4,2.4,-2.4
    -10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,-10.,-9.,-8.,-7.,-6.,-5.,-4.,-3.,-2.,2.,3.,4.,5.,6.,7.,8.,9.,10.,
     0.0,-0.6,-1.4,-2.2,-3.0,-4.0,-5.3,-7.1,-13.0,-13.0,-7.1,-5.3,-4.0,-3.0,-2.2,-1.4,-0.6, 0.0, 0.0, 0.0,-0.1,-0.3,-0.7,-1.3,-2.6,-4.
End of file
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RECONSTRUCTION FROM INCOMPLETE PROJECTIONS

(BY THE SERIES EXPANSION METHOD)

NASA - NONSYMMETRIC CASE, ALFA = 5.5 DEG, Z = 2.54, MACH = 0.8 (LENGTH UNIT IS CM, DENSITY IS IN KG/CUBIC METER )

ZERO OBJECT FIELD OUTSIDE THE RADIUS:      10.000000

WAVELENGTH:                                 0.5320E-04

GLADSTONE-DALE CONSTANT:                    0.2270E-03

TOLERANCE PARAMETER:                        0.1000E-03

NUMBER OF PROJECTIONS:                     18

TOTAL NUMBER OF SAMPLING POINTS:          324

NO SIGN CHANGES OF THE OBJECT FUNCTION ARE PERMITTED


ORDERS OF LEGENDRE POLYNOMIALS AND TRIGONOMETRIC FUNCTIONS IN SERIES:          12          12

PROJECTION, ANGLE, NUMBER OF SAMPLING POINTS, BOUNDARIES OF OPAQUE OBSTACLE
RELATIVE POSITIONS OF INDIVIDUAL SAMPLING POINTS
PROJECTION FUNCTION AT THESE POINTS IN ORDERS OF INTERFERENCE FRINGES

     1      0.0          18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.6 -1.4 -2.2 -3.0 -4.0 -5.3 -7.1-13.0-13.0 -7.1 -5.3 -4.0 -3.0 -2.2 -1.4 -0.6  0.0

     2     10.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0

     3     20.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0

     4     30.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0

     5     40.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0

     6     50.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0

     7     60.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0

     8     70.00         18           -0.2400E+01   0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0
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ORIGINAL PAGE IS
OF POOR QUALITY

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  9     80.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0

 10     90.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.4 -0.9 -1.6 -2.4 -3.4 -4.7 -6.5-13.0-12.0 -5.6 -3.6 -2.4 -1.6 -1.0 -0.6 -0.3  0.0

 11    100.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.1 -0.6 -1.4 -3.4-10.6-11.0 -5.5 -3.3 -2.0 -1.0 -0.5 -0.3 -0.1  0.0

 12    110.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.4 -0.8 -1.5 -2.6 -4.0 -6.0-14.0-13.0 -7.5 -5.0 -3.2 -2.2 -1.5 -0.9 -0.4  0.0

 13    120.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.2 -0.4 -0.9 -1.6 -2.6 -4.0 -5.9-11.0-11.0 -6.9 -5.0 -3.6 -2.6 -1.7 -1.0 -0.4  0.0

 14    130.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.6 -1.6 -2.6 -3.7 -4.9 -6.2 -7.8-13.0-13.0 -6.5 -4.0 -2.3 -1.2 -0.5 -0.2  0.0  0.0

 15    140.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.3 -0.9 -1.5 -4.8-14.0-11.0 -6.5 -4.6 -3.3 -2.4 -1.6 -0.9 -0.4  0.0

 16    150.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0 -0.1 -0.3 -0.6 -1.3 -2.3 -3.8 -6.0-14.0-14.0 -6.4 -4.0 -2.3 -1.4 -0.8 -0.4 -0.2  0.0

 17    160.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0  0.0  0.0 -0.2 -0.5 -1.2 -3.0-10.0-16.0 -5.8 -4.0 -2.4 -1.3 -0.6 -0.2  0.0  0.0

 18    170.00        18          -0.2400E+01    0.2400E+01
-1.00-0.90-0.80-0.70-0.60-0.50-0.40-0.30-0.20 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 0.0  0.0 -0.1 -0.3 -0.7 -1.3 -2.6 -4.9 -9.0-12.0 -6.2 -4.1 -2.6 -1.7 -1.2 -0.7 -0.3  0.0

MAXIMUM ABSOLUTE VALUE OF THE OBJECT FUNCTION:    0.4226E+00

THE RADIUS R IS MULTIPLIED BY:            0.100E+02

THE OBJECT FUNCTION MULTIPLIED BY:        0.100E+04
```

DEG	R		DEG	R		DEG	R		DEG	R	
0.0	100.00	**********	5.00	100.00	**********	10.00	100.00	**********	15.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	0.0		90.00	-0.52		90.00	-25.25		90.00	-54.06
	85.00	0.0		85.00	-4.05		85.00	-20.83		85.00	-40.09
	80.00	0.0		80.00	0.0		80.00	0.0		80.00	-13.72
	75.00	0.0		75.00	0.0		75.00	0.0		75.00	-7.78
	70.00	0.0		70.00	0.0		70.00	-9.61		70.00	-22.32
	65.00	-21.31		65.00	-24.36		65.00	-32.25		65.00	-42.68
	60.00	-40.20		60.00	-42.42		60.00	-48.04		60.00	-55.42
	55.00	-47.90		55.00	-49.27		55.00	-52.58		55.00	-56.75
	50.00	-50.34		50.00	-50.99		50.00	-52.32		50.00	-53.71

ORIGINAL PAGE IS
OF POOR QUALITY

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ORIGINAL PAGE IS
OF POOR QUALITY

	45.00	-61.13		45.00	-61.25		45.00	-61.16		45.00	-60.56
	40.00	-95.84		40.00	-95.67		40.00	-94.78		40.00	-93.09
	35.00	-166.33		35.00	-166.04		35.00	-164.87		35.00	-162.87
	30.00	-276.43		30.00	-276.15		30.00	-275.07		30.00	-273.25
	25.00	-420.17		25.00	-419.97		25.00	-419.14		25.00	-417.76
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-422.55		-25.00	-421.87		-25.00	-420.11		-25.00	-417.44
	-30.00	-292.78		-30.00	-291.70		-30.00	-288.83		-30.00	-284.45
	-35.00	-198.95		-35.00	-197.40		-35.00	-193.22		-35.00	-186.82
	-40.00	-144.53		-40.00	-142.50		-40.00	-136.95		-40.00	-128.49
	-45.00	-123.00		-45.00	-120.55		-45.00	-113.82		-45.00	-103.61
	-50.00	-120.31		-50.00	-117.57		-50.00	-110.08		-50.00	-98.76
	-55.00	-119.66		-55.00	-116.83		-55.00	-109.1[illegible]		-55.00	-97.56
	-60.00	-107.77		-60.00	-105.03		-60.00	-97.61		-60.00	-86.73
	-65.00	-80.77		-65.00	-78.24		-65.00	-71.49		-65.00	-61.84
	-70.00	-47.19		-70.00	-44.90		-70.00	-38.85		-70.00	-30.43
	-75.00	-25.17		-75.00	-23.06		-75.00	-17.48		-75.00	-9.73
	-80.00	-31.52		-80.00	-29.61		-80.00	-24.36		-80.00	-16.55
	-85.00	-62.72		-85.00	-61.36		-85.00	-57.11		-85.00	-49.42
	-90.00	-74.92		-90.00	-75.07		-90.00	-74.13		-90.00	-68.98
	-95.00	0.0		-95.00	0.0		-95.00	-1.13		-95.00	-3.30
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
20.00	100.00	**********	25.00	100.00	**********	30.00	100.00	**********	35.00	100.00	**********
	95.00	-28.79		95.00	-45.07		95.00	-41.26		95.00	-24.38
	90.00	-74.93		90.00	-80.50		90.00	-70.97		90.00	-53.11
	85.00	-53.52		85.00	-56.01		85.00	-47.83		85.00	-33.87
	80.00	-25.61		80.00	-29.87		80.00	-26.06		80.00	-16.98
	75.00	-20.01		75.00	-26.81		75.00	-26.98		75.00	-21.68
	70.00	-34.19		70.00	-42.03		70.00	-44.23		70.00	-41.00
	65.00	-52.67		65.00	-59.57		65.00	-61.78		65.00	-59.13
	60.00	-62.39		60.00	-66.94		60.00	-67.81		60.00	-64.81
	55.00	-60.35		55.00	-62.06		55.00	-61.09		55.00	-57.41
	50.00	-54.35		50.00	-53.54		50.00	-50.93		50.00	-46.69
	45.00	-59.12		45.00	-56.58		45.00	-52.94		45.00	-48.50
	40.00	-90.56		40.00	-87.22		40.00	-83.24		40.00	-78.98
	35.00	-160.10		35.00	-156.73		35.00	-153.00		35.00	-149.24
	30.00	-270.81		30.00	-267.93		30.00	-264.81		30.00	-261.73
	25.00	-415.91		25.00	-413.73		25.00	-411.38		25.00	-409.02
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-414.10		-25.00	-410.38		-25.00	-406.61		-25.00	-403.10
	-30.00	-278.99		-30.00	-272.97		-30.00	-265.94		-30.00	-261.45
	-35.00	-178.88		-35.00	-170.19		-35.00	-161.62		-35.00	-153.95
	-40.00	-118.04		-40.00	-106.71		-40.00	-95.67		-40.00	-85.98
	-45.00	-91.07		-45.00	-77.62		-45.00	-64.68		-45.00	-53.55

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	-50.00	-85.01
	-55.00	-83.78
	-60.00	-74.09
	-65.00	-51.12
	-70.00	-21.64
	-75.00	-1.91
	-80.00	-8.19
	-85.00	-39.47
	-90.00	-58.66
	-95.00	0.0
	-100.00	**********
40.00	100.00	**********
	95.00	-4.72
	90.00	-35.92
	85.00	-20.65
	80.00	-6.88
	75.00	-13.56
	70.00	-33.97
	65.00	-52.69
	60.00	-58.76
	55.00	-51.76
	50.00	-41.52
	45.00	-43.88
	40.00	-74.97
	35.00	-145.86
	30.00	-258.96
	25.00	-406.83
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-400.10
	-30.00	-256.92
	-35.00	-147.85
	-40.00	-78.52
	-45.00	-45.23
	-50.00	-36.77
	-55.00	-38.35
	-60.00	-36.95
	-65.00	-26.54
	-70.00	-10.97
	-75.00	-2.29
	-80.00	-12.21
	-85.00	-37.03
	-90.00	-41.70
	-95.00	0.0
	-100.00	**********
60.00	100.00	**********
	95.00	0.0
	90.00	-31.58
	85.00	-20.83
	80.00	0.0
	75.00	0.0
	70.00	-9.01
	65.00	-28.07

	-50.00	-70.45
	-55.00	-69.51
	-60.00	-61.53
	-65.00	-41.26
	-70.00	-14.55
	-75.00	0.0
	-80.00	-2.23
	-85.00	-30.65
	-90.00	-46.37
	-95.00	0.0
	-100.00	**********
45.00	100.00	**********
	95.00	0.0
	90.00	-25.85
	85.00	-12.94
	80.00	0.0
	75.00	-5.33
	70.00	-25.36
	65.00	-44.34
	60.00	-51.29
	55.00	-45.49
	50.00	-36.48
	45.00	-39.91
	40.00	-71.81
	35.00	-143.26
	30.00	-256.76
	25.00	-404.96
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-397.81
	-30.00	-253.67
	-35.00	-143.75
	-40.00	-73.84
	-45.00	-40.37
	-50.00	-32.21
	-55.00	-34.60
	-60.00	-34.52
	-65.00	-25.80
	-70.00	-12.17
	-75.00	-5.40
	-80.00	-16.88
	-85.00	-42.42
	-90.00	-46.41
	-95.00	0.0
	-100.00	**********
65.00	100.00	**********
	95.00	0.0
	90.00	-34.79
	85.00	-26.37
	80.00	-2.11
	75.00	0.0
	70.00	-10.26
	65.00	-29.99

	-50.00	-56.70
	-55.00	-56.40
	-60.00	-50.59
	-65.00	-33.66
	-70.00	-10.57
	-75.00	0.0
	-80.00	-1.21
	-85.00	-26.95
	-90.00	-37.81
	-95.00	0.0
	-100.00	**********
50.00	100.00	**********
	95.00	0.0
	90.00	-24.09
	85.00	-11.89
	80.00	0.0
	75.00	0.0
	70.00	-17.32
	65.00	-36.26
	60.00	-44.33
	55.00	-40.21
	50.00	-32.83
	45.00	-37.48
	40.00	-70.08
	35.00	-141.80
	30.00	-255.33
	25.00	-403.52
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-396.34
	-30.00	-251.84
	-35.00	-141.84
	-40.00	-72.15
	-45.00	-39.17
	-50.00	-31.61
	-55.00	-34.54
	-60.00	-34.72
	-65.00	-25.94
	-70.00	-11.92
	-75.00	-4.63
	-80.00	-15.66
	-85.00	-40.94
	-90.00	-44.64
	-95.00	0.0
	-100.00	**********
70.00	100.00	**********
	95.00	0.0
	90.00	-38.83
	85.00	-32.66
	80.00	-7.71
	75.00	-1.00
	70.00	-15.07
	65.00	-35.84

	-50.00	-45.13
	-55.00	-45.74
	-60.00	-42.28
	-65.00	-28.87
	-70.00	-9.80
	-75.00	0.0
	-80.00	-5.45
	-85.00	-29.95
	-90.00	-36.77
	-95.00	0.0
	-100.00	**********
55.00	100.00	**********
	95.00	0.0
	90.00	-27.42
	85.00	-15.49
	80.00	0.0
	75.00	0.0
	70.00	-11.52
	65.00	-30.37
	60.00	-39.74
	55.00	-37.44
	50.00	-31.67
	45.00	-37.31
	40.00	-70.23
	35.00	-141.73
	30.00	-254.80
	25.00	-402.57
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-395.67
	-30.00	-251.39
	-35.00	-142.02
	-40.00	-73.31
	-45.00	-41.43
	-50.00	-34.74
	-55.00	-37.92
	-60.00	-37.40
	-65.00	-26.83
	-70.00	-10.14
	-75.00	0.0
	-80.00	-8.16
	-85.00	-31.80
	-90.00	-35.18
	-95.00	0.0
	-100.00	**********
75.00	100.00	**********
	95.00	0.0
	90.00	-46.98
	85.00	-41.07
	80.00	-15.03
	75.00	-7.80
	70.00	-22.40
	65.00	-44.36

ORIGINAL PAGE IS
OF POOR QUALITY

	60.00	-38.85
	55.00	-38.22
	50.00	-33.70
	45.00	-39.82
	40.00	-72.42
	35.00	-143.09
	30.00	-255.17
	25.00	-402.12
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-395.72
	-30.00	-252.13
	-35.00	-143.95
	-40.00	-76.81
	-45.00	-46.52
	-50.00	-40.96
	-55.00	-44.26
	-60.00	-42.45
	-65.00	-29.03
	-70.00	-8.26
	-75.00	0.0
	-80.00	0.0
	-85.00	-19.66
	-90.00	-23.53
	-95.00	0.0
	-100.00	**********
80.00	100.00	**********
	95.00	0.0
	90.00	-60.35
	85.00	-51.46
	80.00	-23.09
	75.00	-15.14
	70.00	-30.38
	65.00	-53.54
	60.00	-69.14
	55.00	-71.41
	50.00	-66.34
	45.00	-68.33
	40.00	-94.18
	35.00	-157.05
	30.00	-261.85
	25.00	-403.23
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-399.43
	-30.00	-259.54

	60.00	-42.18
	55.00	-42.90
	50.00	-39.04
	45.00	-44.92
	40.00	-76.51
	35.00	-145.74
	30.00	-256.33
	25.00	-402.10
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-396.34
	-30.00	-253.73
	-35.00	-147.09
	-40.00	-81.87
	-45.00	-53.49
	-50.00	-49.28
	-55.00	-52.79
	-60.00	-49.63
	-65.00	-33.25
	-70.00	-8.34
	-75.00	0.0
	-80.00	0.0
	-85.00	-11.94
	-90.00	-18.46
	-95.00	0.0
	-100.00	**********
85.00	100.00	**********
	95.00	-0.82
	90.00	-75.48
	85.00	-60.94
	80.00	-29.33
	75.00	-20.61
	70.00	-36.62
	65.00	-61.04
	60.00	-77.59
	55.00	-80.04
	50.00	-74.29
	45.00	-74.88
	40.00	-98.97
	35.00	-160.01
	30.00	-263.23
	25.00	-403.45
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-400.21
	-30.00	-260.56

	60.00	-49.34
	55.00	-50.94
	50.00	-47.11
	45.00	-52.08
	40.00	-82.04
	35.00	-149.31
	30.00	-258.05
	25.00	-402.39
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-397.31
	-30.00	-255.77
	-35.00	-150.76
	-40.00	-87.53
	-45.00	-61.13
	-50.00	-55.38
	-55.00	-62.34
	-60.00	-59.27
	-65.00	-39.67
	-70.00	-11.79
	-75.00	0.0
	-80.00	0.0
	-85.00	-14.14
	-90.00	-25.89
	-95.00	0.0
	-100.00	**********
90.00	100.00	**********
	95.00	-17.94
	90.00	-85.30
	85.00	-64.86
	80.00	-30.63
	75.00	-21.81
	70.00	-39.02
	65.00	-64.90
	60.00	-82.49
	55.00	-85.29
	50.00	-79.18
	45.00	-78.91
	40.00	-101.84
	35.00	-161.70
	30.00	-263.89
	25.00	-403.36
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-400.67
	-30.00	-260.75

	60.00	-58.99
	55.00	-61.06
	50.00	-56.74
	45.00	-60.30
	40.00	-88.23
	35.00	-153.28
	30.00	-260.01
	25.00	-402.83
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-398.40
	-30.00	-257.84
	-35.00	-154.26
	-40.00	-92.77
	-45.00	-68.13
	-50.00	-66.78
	-55.00	-71.41
	-60.00	-67.10
	-65.00	-47.49
	-70.00	-18.41
	-75.00	0.0
	-80.00	0.0
	-85.00	-26.31
	-90.00	-44.50
	-95.00	0.0
	-100.00	**********
95.00	100.00	**********
	95.00	-22.35
	90.00	-83.39
	85.00	-59.69
	80.00	-25.16
	75.00	-17.65
	70.00	-36.67
	65.00	-64.14
	60.00	-82.83
	55.00	-86.19
	50.00	-80.21
	45.00	-79.76
	40.00	-102.36
	35.00	-161.84
	30.00	-263.68
	25.00	-402.90
	20.00	**********
	15.00	**********
	10.00	**********
	5.00	**********
	0.0	**********
	-5.00	**********
	-10.00	**********
	-15.00	**********
	-20.00	**********
	-25.00	-400.77
	-30.00	-260.10

A152

ORIGINAL PAGE IS
OF POOR QUALITY

	-35.00	-156.94		-35.00	-158.33		-35.00	-158.18		-35.00	-156.50
	-40.00	-96.66		-40.00	-98.52		-40.00	-97.99		-40.00	-95.13
	-45.00	-73.28		-45.00	-75.66		-45.00	-74.79		-45.00	-70.79
	-50.00	-73.02		-50.00	-75.92		-50.00	-74.88		-50.00	-70.00
	-55.00	-78.36		-55.00	-81.79		-55.00	-80.87		-55.00	-75.65
	-60.00	-74.38		-60.00	-78.41		-60.00	-78.05		-60.00	-73.17
	-65.00	-54.90		-65.00	-59.79		-65.00	-60.53		-65.00	-56.69
	-70.00	-26.23		-70.00	-32.47		-70.00	-34.81		-70.00	-32.43
	-75.00	-5.44		-75.00	-13.72		-75.00	-17.86		-75.00	-16.67
	-80.00	-10.64		-80.00	-21.58		-80.00	-27.04		-80.00	-25.76
	-85.00	-42.99		-85.00	-56.59		-85.00	-61.74		-85.00	-57.84
	-90.00	-66.16		-90.00	-80.89		-90.00	-82.79		-90.00	-72.98
	-95.00	-8.72		-95.00	-20.64		-95.00	-16.21		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
100.00	100.00	**********	105.00	100.00	**********	110.00	100.00	**********	115.00	100.00	**********
	95.00	-10.42		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	-68.63		90.00	-46.92		90.00	-28.25		90.00	-20.73
	85.00	-46.06		85.00	-29.32		85.00	-17.07		85.00	-14.76
	80.00	-14.17		80.00	-2.00		80.00	0.0		80.00	0.0
	75.00	-9.33		75.00	-0.07		75.00	0.0		75.00	0.0
	70.00	-30.38		70.00	-22.48		70.00	-15.75		70.00	-12.15
	65.00	-59.21		65.00	-51.71		65.00	-43.78		65.00	-37.21
	60.00	-78.75		60.00	-71.38		60.00	-62.44		60.00	-53.65
	55.00	-82.71		55.00	-75.67		55.00	-66.49		55.00	-56.79
	50.00	-77.25		50.00	-70.94		50.00	-62.43		50.00	-53.18
	45.00	-77.33		45.00	-72.10		45.00	-64.99		45.00	-57.22
	40.00	-100.46		40.00	-96.49		40.00	-91.15		40.00	-85.36
	35.00	-160.41		35.00	-157.66		35.00	-154.07		35.00	-150.29
	30.00	-262.62		30.00	-260.87		30.00	-258.72		30.00	-256.57
	25.00	-402.08		25.00	-401.01		25.00	-399.84		25.00	-398.78
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-400.58		-25.00	-400.22		-25.00	-399.86		-25.00	-399.66
	-30.00	-258.76		-30.00	-256.98		-30.00	-255.11		-30.00	-253.49
	-35.00	-153.58		-35.00	-149.88		-35.00	-146.00		-35.00	-142.55
	-40.00	-90.39		-40.00	-84.51		-40.00	-78.42		-40.00	-73.02
	-45.00	-64.27		-45.00	-56.32		-45.00	-48.21		-45.00	-41.19
	-50.00	-62.11		-50.00	-52.58		-50.00	-43.07		-50.00	-35.14
	-55.00	-67.07		-55.00	-56.79		-55.00	-46.79		-55.00	-38.90
	-60.00	-64.77		-60.00	-54.70		-60.00	-45.17		-60.00	-38.16
	-65.00	-49.23		-65.00	-40.14		-65.00	-31.73		-65.00	-26.03
	-70.00	-26.23		-70.00	-18.34		-70.00	-11.11		-70.00	-6.44
	-75.00	-11.25		-75.00	-3.98		-75.00	0.0		-75.00	0.0
	-80.00	-19.55		-80.00	-11.57		-80.00	-4.34		-80.00	0.0
	-85.00	-48.39		-85.00	-38.06		-85.00	-29.74		-85.00	-23.54
	-90.00	-57.88		-90.00	-44.55		-90.00	-36.47		-90.00	-32.52
	-95.00	0.0		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
120.00	100.00	**********	125.00	100.00	**********	130.00	100.00	**********	135.00	100.00	**********
	95.00	0.0		95.00	0.0		95.00	0.0		95.00	0.0
	90.00	-25.70		90.00	-37.23		90.00	-46.56		90.00	-48.19
	85.00	-22.36		85.00	-34.35		85.00	-43.32		85.00	-44.62
	80.00	-1.07		80.00	-11.10		80.00	-18.41		80.00	-19.42

A153

ORIGINAL PAGE IS
OF POOR QUALITY

140.00		145.00		150.00		155.00	
75.00	0.0	75.00	-3.04	75.00	-7.65	75.00	-8.19
70.00	-11.91	70.00	-13.59	70.00	-15.14	70.00	-15.14
65.00	-32.82	65.00	-30.41	65.00	-29.28	65.00	-28.89
60.00	-46.29	60.00	-41.03	60.00	-38.12	60.00	-37.65
55.00	-48.08	55.00	-41.53	55.00	-37.92	55.00	-37.72
50.00	-44.69	50.00	-38.27	50.00	-34.91	50.00	-35.25
45.00	-50.08	45.00	-44.80	45.00	-42.32	45.00	-43.28
40.00	-80.15	40.00	-76.47	40.00	-75.10	40.00	-76.56
35.00	-147.00	35.00	-144.91	35.00	-144.54	35.00	-146.24
30.00	-254.84	30.00	-253.96	30.00	-254.24	30.00	-255.89
25.00	-398.05	25.00	-397.87	25.00	-398.40	25.00	-399.72
20.00	**********	20.00	**********	20.00	**********	20.00	**********
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********
-20.00	**********	-20.00	**********	-20.00	**********	-20.00	**********
-25.00	-399.79	-25.00	-400.37	-25.00	-401.46	-25.00	-403.05
-30.00	-252.46	-30.00	-252.23	-30.00	-252.93	-30.00	-254.54
-35.00	-140.04	-35.00	-138.84	-35.00	-139.11	-35.00	-140.77
-40.00	-69.08	-40.00	-67.07	-40.00	-67.13	-40.00	-69.09
-45.00	-36.25	-45.00	-33.94	-45.00	-34.33	-45.00	-37.00
-50.00	-29.98	-50.00	-28.14	-50.00	-29.53	-50.00	-33.44
-55.00	-34.40	-55.00	-33.82	-55.00	-36.83	-55.00	-42.37
-60.00	-35.01	-60.00	-36.11	-60.00	-40.93	-60.00	-48.15
-65.00	-24.29	-65.00	-26.79	-65.00	-32.91	-65.00	-41.25
-70.00	-5.36	-70.00	-8.07	-70.00	-14.10	-70.00	-22.38
-75.00	0.0	-75.00	0.0	-75.00	0.0	-75.00	-2.54
-80.00	0.0	-80.00	0.0	-80.00	0.0	-80.00	0.0
-85.00	-18.13	-85.00	-12.94	-85.00	-9.50	-85.00	-10.74
-90.00	-29.40	-90.00	-25.36	-90.00	-22.17	-90.00	-24.08
-95.00	0.0	-95.00	0.0	-95.00	0.0	-95.00	0.0
-100.00	**********	-100.00	**********	-100.00	**********	-100.00	**********
100.00	**********	100.00	**********	100.00	**********	100.00	**********
95.00	0.0	95.00	0.0	95.00	0.0	95.00	0.0
90.00	-43.31	90.00	-38.21	90.00	-39.07	90.00	-47.43
85.00	-39.03	85.00	-31.73	85.00	-28.50	85.00	-31.97
80.00	-14.52	80.00	-7.51	80.00	-3.00	80.00	-3.75
75.00	-4.83	75.00	-0.05	75.00	0.0	75.00	0.0
70.00	-13.68	70.00	-12.21	70.00	-12.68	70.00	-16.33
65.00	-29.35	65.00	-31.38	65.00	-35.84	65.00	-43.10
60.00	-39.80	60.00	-44.82	60.00	-52.81	60.00	-63.40
55.00	-41.18	55.00	-48.27	55.00	-58.60	55.00	-71.37
50.00	-39.54	50.00	-47.60	50.00	-58.85	50.00	-72.27
45.00	-47.87	45.00	-55.91	45.00	-66.74	45.00	-79.36
40.00	-80.99	40.00	-88.19	40.00	-97.60	40.00	-108.34
35.00	-150.11	35.00	-155.97	35.00	-163.38	35.00	-171.68
30.00	-258.94	30.00	-263.24	30.00	-268.51	30.00	-274.29
25.00	-401.83	25.00	-404.64	25.00	-407.96	25.00	-411.52
20.00	**********	20.00	**********	20.00	**********	20.00	**********
15.00	**********	15.00	**********	15.00	**********	15.00	**********
10.00	**********	10.00	**********	10.00	**********	10.00	**********
5.00	**********	5.00	**********	5.00	**********	5.00	**********
0.0	**********	0.0	**********	0.0	**********	0.0	**********
-5.00	**********	-5.00	**********	-5.00	**********	-5.00	**********
-10.00	**********	-10.00	**********	-10.00	**********	-10.00	**********
-15.00	**********	-15.00	**********	-15.00	**********	-15.00	**********

	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-405.10		-25.00	-407.48		-25.00	-410.03		-25.00	-412.60
	-30.00	-256.95		-30.00	-259.94		-30.00	-263.25		-30.00	-266.60
	-35.00	-143.60		-35.00	-147.22		-35.00	-151.24		-35.00	-155.24
	-40.00	-72.50		-40.00	-76.77		-40.00	-81.31		-40.00	-85.59
	-45.00	-41.23		-45.00	-46.14		-45.00	-50.88		-45.00	-54.84
	-50.00	-38.75		-50.00	-44.23		-50.00	-48.78		-50.00	-51.72
	-55.00	-48.93		-55.00	-54.88		-55.00	-58.89		-55.00	-60.20
	-60.00	-55.91		-60.00	-62.26		-60.00	-65.59		-60.00	-65.06
	-65.00	-49.88		-65.00	-56.62		-65.00	-59.60		-65.00	-57.72
	-70.00	-31.26		-70.00	-38.59		-70.00	-42.12		-70.00	-40.25
	-75.00	-11.02		-75.00	-19.42		-75.00	-25.00		-75.00	-25.15
	-80.00	-4.57		-80.00	-14.92		-80.00	-24.27		-80.00	-28.36
	-85.00	-18.65		-85.00	-32.09		-85.00	-46.28		-85.00	-54.69
	-90.00	-34.31		-90.00	-51.67		-90.00	-69.72		-90.00	-79.44
	-95.00	-3.61		-95.00	-23.39		-95.00	-40.40		-95.00	-44.34
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********
160.00	100.00	**********	165.00	100.00	**********	170.00	100.00	**********	175.00	100.00	**********
	95.00	0.0		95.00	-3.74		95.00	-1.43		95.00	0.0
	90.00	-59.52		90.00	-69.63		90.00	-74.57		90.00	-75.29
	85.00	-40.54		85.00	-50.23		85.00	-57.65		85.00	-61.64
	80.00	-9.42		80.00	-17.48		80.00	-24.98		80.00	-29.92
	75.00	-3.26		75.00	-10.75		75.00	-18.17		75.00	-23.40
	70.00	-23.08		70.00	-31.52		70.00	-39.58		70.00	-45.26
	65.00	-52.62		65.00	-62.97		65.00	-72.25		65.00	-78.62
	60.00	-75.61		60.00	-87.88		60.00	-98.38		60.00	-105.41
	55.00	-85.29		55.00	-98.70		55.00	-109.87		55.00	-117.21
	50.00	-86.48		50.00	-99.87		50.00	-110.82		50.00	-117.95
	45.00	-92.48		45.00	-104.67		45.00	-114.54		45.00	-120.91
	40.00	-119.36		40.00	-129.49		40.00	-137.62		40.00	-142.83
	35.00	-180.08		35.00	-187.73		35.00	-193.83		35.00	-197.71
	30.00	-280.06		30.00	-285.26		30.00	-289.37		30.00	-291.97
	25.00	-415.02		25.00	-418.14		25.00	-420.58		25.00	-422.10
	20.00	**********		20.00	**********		20.00	**********		20.00	**********
	15.00	**********		15.00	**********		15.00	**********		15.00	**********
	10.00	**********		10.00	**********		10.00	**********		10.00	**********
	5.00	**********		5.00	**********		5.00	**********		5.00	**********
	0.0	**********		0.0	**********		0.0	**********		0.0	**********
	-5.00	**********		-5.00	**********		-5.00	**********		-5.00	**********
	-10.00	**********		-10.00	**********		-10.00	**********		-10.00	**********
	-15.00	**********		-15.00	**********		-15.00	**********		-15.00	**********
	-20.00	**********		-20.00	**********		-20.00	**********		-20.00	**********
	-25.00	-414.99		-25.00	-417.06		-25.00	-418.68		-25.00	-419.73
	-30.00	-269.74		-30.00	-272.44		-30.00	-274.52		-30.00	-275.88
	-35.00	-158.90		-35.00	-161.96		-35.00	-164.26		-35.00	-165.73
	-40.00	-89.24		-40.00	-92.10		-40.00	-94.11		-40.00	-95.33
	-45.00	-57.71		-45.00	-59.50		-45.00	-60.45		-45.00	-60.89
	-50.00	-52.87		-50.00	-52.59		-50.00	-51.57		-50.00	-50.62
	-55.00	-58.84		-55.00	-55.61		-55.00	-51.82		-55.00	-48.89
	-60.00	-60.87		-60.00	-54.27		-60.00	-47.27		-60.00	-42.03
	-65.00	-51.18		-65.00	-41.55		-65.00	-31.50		-65.00	-23.98
	-70.00	-32.75		-70.00	-21.23		-70.00	-8.88		-70.00	0.0
	-75.00	-18.66		-75.00	-6.76		-75.00	0.0		-75.00	0.0
	-80.00	-24.38		-80.00	-12.79		-80.00	0.0		-80.00	0.0
	-85.00	-52.45		-85.00	-39.29		-85.00	-20.28		-85.00	-3.78
	-90.00	-74.08		-90.00	-53.41		-90.00	-24.82		-90.00	-0.30
	-95.00	-28.20		-95.00	0.0		-95.00	0.0		-95.00	0.0
	-100.00	**********		-100.00	**********		-100.00	**********		-100.00	**********